Loudoun County Bicycle and Pedestrian Mobility Master Plan

Executive Summary

Bicycling and walking are popular activities in Loudoun County both for transportation and recreation. Walking and bicycling are pleasant and enjoyable activities in neighborhoods that were built with sidewalks, street trees, and paved trails. The Washington and Old Dominion Trail is a well used and cherished resource that traverses the County from east to west.

In many places, however, travel by foot and bicycle is difficult. Pedestrians face many physical barriers in the public right-of-way, including discontinuous sidewalks, dangerous road crossings, high speed traffic, and sidewalks that are blocked by poles, fire hydrants and other obstacles. There are no bike lanes in the County, and neighborhood bike paths are often narrow and winding and do not connect to destinations.

While growth of the road network has accompanied Loudoun's dramatic population growth in recent years, expansion of the bicycle and pedestrian network has not. Bicycling or walking is often not a safe or convenient option. This situation has the greatest impact on County residents who are unable to drive or cannot afford to own and operate an automobile.

In July 2001, the Loudoun County Board of Supervisors adopted the Revised General Plan and Revised Countywide Transportation Plan (CTP) providing a development framework based on smart growth principles. The Revised General Plan calls for completion of a Countywide Bicycle and Pedestrian Mobility Master Plan to help implement Loudoun's vision of a transportation system that:

- Recognizes the intrinsic value of bicycling and walking, and
- Advances bicycle and pedestrian mobility as a transportation goal.

This Bicycle and Pedestrian Mobility Master Plan (Plan) is the product of extensive analysis conducted by a Citizens' Advisory Committee, county staff and consultants, combined with information and ideas offered by residents of Loudoun County.

This Plan identifies many locations that are in need of improvements such as new sidewalks, bike lanes, pathways, and intersection crossing improvements. The Plan focuses primarily on the existing road

Washington and Old Dominion Trail

network. Although the W&OD Trail offers an excellent "car-free" alternative, there are few remaining abandoned rail corridors that can be used to build off-road trails.

In addition to improving roadways and intersections for bicyclists and pedestrians, the Plan calls for the development of a variety of other programs that support and encourage more cycling and walking. More County residents will bicycle and walk for short trips if mixed-use development becomes more common, secure bike parking is provided at destinations, and bike safety and promotion programs are developed. As new bike lanes and sidewalks are built throughout the County, school-based pedestrian safety and traffic law enforcement programs will also be needed to teach everyone how to share the road safely.

With an adopted bicycle and pedestrian plan, Loudoun County can ensure that bicycle and pedestrian accommodations will be more fully integrated into local, state and regional transportation improvements. State and federal transportation policy with regard to bicycle and pedestrian accommodations continues to evolve and improve, creating new priorities and opportunities for funding. A clear articulation of local bicycle and pedestrian needs is vital to ensure that our transportation investments will improve and expand opportunities for bicycling and walking in Loudoun County.

Why is Bicycle and Pedestrian Mobility Important to Loudoun County?

Bicycling and walking issues are important to Loudoun County residents for a variety of reasons:

Bicycling and walking are a necessary part of the transportation system in Loudoun County.

Already significant numbers of people are walking and bicycling in locations that are not safe. Improving intersections, completing sidewalks, and providing highway overpasses will reduce the potential for bicycle and pedestrian fatalities and injuries from crashes with motor vehicles.

Bicycling and walking can play a vital role in improving the health of Loudoun County residents.

Research conducted in 1999 by the Centers for Disease Control found that "obesity and overweight are linked to the nation's number one killer – heart disease – as well as diabetes and other chronic conditions." The report also states that one reason for Americans' sedentary lifestyle is that "walking and cycling have been replaced by automobile travel for all but the shortest distances."[1]

Increased levels of bicycling and walking will help to improve air and water quality in Loudoun County.

The Washington (DC) metropolitan region, of which Loudoun County is a part, is classified as a severe non-attainment area for ground level ozone by the U.S. Environmental Protection Agency. This means air quality in the County is below federal health-based standards for clean air. Motor vehicle pollution is a major contributor to ozone pollution.

Developing trails, bikeways and walkable communities makes good economic sense for Loudoun County.

Businesses tend to invest more in locations that have a high quality of life, and corporate employers have an easier time attracting good workers to these locations. Loudoun County's ability to retain its status as a first class employment location will depend on its perception as a high quality place to live.

Bicycling and walking can improve the overall quality-of-life of Loudoun County residents.

Providing a livable community is a necessary part of attracting and keeping businesses and ensuring that Loudoun County remains competitive in the 21st century. Bicycling and walking are integral to the image of Loudoun County as a safe and welcoming community.

Summary of Vision and Goals

Loudoun County's vision for bicycling and walking provides the public, elected officials, county staff and others a clear picture of the future transportation network. The specific goals speak directly to the particular areas of emphasis that need action and provide a solid framework for the recommendations of this Plan.

Vision Statement

Loudoun County – a place where pedestrians and bicyclists of all abilities have a safe, secure, and convenient alternative transportation network of walkways and bikeways that enable everyone to move efficiently to and from such places as work, school, transit, shopping, libraries, parks and recreation.

To realize this vision the Committee established five goals, which follow:

Connectivity: *Develop a comprehensive walkway, bikeway and shared-use path network among residential neighborhoods, Towns, workplaces, shopping centers, transit stations, historic districts, schools, libraries, recreation centers, parks, etc.*

Diverse Users: *Accommodate the widest possible range of use abilities.*

Education and Promotion: *Educate public officials, business and community leaders and the general public.*

Safety and Security: *Increase the levels of bicyclist and pedestrian safety and security.*

Funding for Construction and Maintenance: *Ensure adequate funding for construction and maintenance of the pedestrian and bicycle network and related facilities.*

Implementation Strategy

Successful implementation of this Plan will require effective partnerships among many agencies, jurisdictions, and community leaders. A sustained effort that identifies high priority actions for early attention and recognizes the long term nature of some improvements is needed. Some actions should be commenced in the near term to build upon the knowledge and resources gained during the development of this Plan. Other actions will naturally follow and will be determined, in a large part, by opportunities that emerge in the future.

High Priority Actions, Years 1-5

1. Establish and dedicate an ongoing source of local revenue to provide a funding base and source of matching funds for the bicycle and pedestrian program.

2. Incorporate policies set forward in this Plan into practice through revisions to the FSM, revisions to zoning and subdivision ordinances, and modifications to standard procedures.

3. Ensure that every opportunity is used to improve bicycle and pedestrian conditions along the Major Road and Connecting Corridors listed in this Plan.

4. Work with VDOT to ensure that the agency also integrates these policies into its approach to roadway planning and

design in Loudoun County. Work closely with VDOT on specific road projects to ensure bicycle and pedestrian facilities are fully incorporated into the design and construction, per the recommendations of this Plan.

5. Develop an interdisciplinary bicycle program and establish a full-time bicycle and pedestrian coordinator position.

6. Establish an ongoing citizens' bicycle and pedestrian advisory body, with responsibilities as identified herein.

7. Apply for Enhancement funding to plan, design and construct a bridge over Route 7, as identified in this Plan.

8. Initiate feasibility studies for off-road corridors identified in this Plan, and proceed with development of those corridors deemed feasible.

9. Encourage the Towns to adopt the Network Map, or suggest amendments for the Network within the Towns.

10. Insist that VDOT incorporate bicycle and pedestrian improvements in accordance with this Plan and in all projects in Loudoun County.

11. Identify most needed areas for pedestrian and bicycle improvements for implementation as funds become available.

Priority Improvements: Quickest and Least Expensive

1. Request that the Dulles Rail Extension Trail be included in the planning, design and funding activities currently underway.

2. Request that the Route 28 project include appropriate bicycle and pedestrian accommodations through all interchanges.

3. Seek funding to implement one Neighborhood Connector project per year, and three major intersection improvements per year.

4. In partnership with tourism officials, conduct a field study of the two Rural Bicycle Touring Routes identified in this Plan, develop a designation plan and install signs on these routes.

5. Install bicycle storage lockers at all park-and-ride lots.

6. In partnership with the School Board,, establish a pilot Safe Routes to School program in Loudoun County, per the recommendations of this Plan.

7. Participate in Walk a Child to School Day in October of each year, encourage more schools to take part in the event each year. Continue to assist/sponsor Bike to Work Day activities.

8. Encourage and support the towns' efforts to implement elements of the network identified in the Plan as well as town plans.

Conclusion

The Loudoun County Bicycle and Pedestrian Mobility Master Plan sets forward a comprehensive strategy in order to achieve the goals established in the Revised General Plan and the Revised Countywide Transportation Plan. There is growing support for multi-modal transportation not only among residents of Loudoun County, but throughout the Washington, DC region.

Chapter 1: Introduction

The Loudoun County Bicycle and Pedestrian Mobility Master Plan: Origins and Purpose

Bicycling and walking are popular activities in Loudoun County both for transportation and recreation. Walking and bicycling are pleasant and enjoyable activities in a number of residential developments throughout the County that were built with sidewalks, street trees, and paved trails. The Washington and Old Dominion Trail is a well used and cherished resource that traverses the County from east to west.

In many places, however, travel by foot and bicycle is difficult. Pedestrians face many physical barriers in the public right-of-way, including discontinuous sidewalks, dangerous road crossings, high speed traffic, and sidewalks that are blocked by poles, fire hydrants and other obstacles. There are no bike lanes in the County, and neighborhood bike paths often are narrow and winding, and do not connect to destinations.

While growth of the road network has accompanied Loudoun's dramatic population growth in recent years, expansion of the bicycle and pedestrian network has not. Bicycling or walking is often not a safe or convenient option.

In July 2001, the Loudoun County Board of Supervisors adopted the Revised General Plan and Revised Countywide Transportation Plan (CTP) providing a development framework based on smart growth principles. The Revised General Plan calls for completion of a Countywide Bicycle and Pedestrian Mobility Master Plan to help implement Loudoun's vision of a transportation system that:

- Recognizes the intrinsic value of bicycling and walking, and
- Advances bicycle and pedestrian mobility as a transportation goal.

Physical barriers to bicycling and walking are common

This Bicycle and Pedestrian Mobility Master Plan (Plan) is the product of many hours of work by a Citizens' Advisory Committee and extensive public input, and its incorporation into the CTP provides a framework for a multi-modal County transportation system.

The central element of the Plan is the identification of a countywide network of recommended bikeways and walkways to improve non-motorized transportation and access. In addition to the network, policy and program recommendations are provided to support and

encourage more cycling and walking. Road and land development policy, and school, park and transit access policy are specifically addressed. Promotion, safety education and enforcement programs are also recommended to encourage everyone to share the roads and pathways safely. An institutional framework discussing funding, network maintenance, program staffing and ongoing citizen involvement is proposed to begin charting the course for plan implementation.

Because of the Plan's primary focus on transportation, recreational walking activities as well as hiking and horseback riding are not addressed in this plan but rather in separate planning efforts.

With an adopted bicycle and pedestrian plan, Loudoun County can ensure that bicycle and pedestrian accommodations will be more fully integrated into local, state and regional transportation improvements. State and federal transportation policy with regard to bicycle and pedestrian accommodations continues to evolve and improve, creating new priorities and opportunities for funding. A clear articulation of local bicycle and pedestrian needs is vital to ensure that the transportation investments will improve and expand opportunities for bicycling and walking in Loudoun, as well as for driving and using public transit.

A. The Importance of Bicycling and Walking in Loudoun County

Transportation and Safety Benefits

Bicycling and walking are a much needed element of the transportation system in Loudoun County.

- Nearly half of all travel trips taken in the U.S. are 3 miles or less in length; 28 percent are less than 1 mile.[2] Most trips of these distances are easily made by bicycle or on foot. To increase the share of these trips that are made biking or walking, bicycle and pedestrian infrastructure is needed to form important connections between residential communities, employment and shopping areas, civic centers, parks, recreational trails and cultural attractions.

- Many people in Loudoun County need a mode of travel that is an alternative to the automobile. Because of age or economic circumstances, many Loudoun County residents--children, low-income residents and retirees--do not have access to an automobile.

- According to national surveys, 36 percent of Americans say they would walk or ride a bicycle to work, or to run errands, if it was safe and convenient to do so.[3]

- Demand is indicated by the significant numbers of people already walking and bicycling in locations that are not safe. Improving intersections, completing sidewalks, and providing highway overpasses will improve safety and reduce the potential for bicycle and pedestrian fatalities and injuries from crashes with motor vehicles.

Health Benefits

Bicycling and walking can play a vital role in improving the health of Loudoun County residents.

- In 1999, the Centers for Disease Control and Prevention estimated that 61 percent of U.S. adults were either *overweight* or *obese*. In 2000, a total of 38.8 million American adults could be classified as obese. [4]

- Today, there are nearly twice as many overweight children and almost three times as many overweight adolescents as there were in 1980. Results of the National Health and Nutrition Examination Survey (1999) showed that 13 percent of children and adolescents were overweight.[5]

- In Virginia, the prevalence of obesity increased by 100% between 1991 and 2001, to 20 percent of the population[6]

- Research conducted in 1999 by the Centers for Disease Control found that "obesity and overweight are linked to the nation's number one killer – heart disease – as well as diabetes and other chronic conditions." The report also states that one reason for Americans' sedentary lifestyle is that "walking and cycling have been replaced by automobile travel for all but the shortest distances." [7]

- Numerous studies have shown tremendous health benefits from even a brief amount of light but regular exercise each day.[8]

- Total costs attributed to obesity (medical costs and lost productivity) amounted to an estimated $117 billion in the year 2000, 10% of total national health care costs. Poor nutrition and physical inactivity account for some 300,000 premature deaths in the United States each year.[9]

Environmental Benefits

Increased levels of bicycling and walking will decrease motor vehicle use and help to improve air and water quality in Loudoun County and the region.

- The Washington metropolitan area is classified as being in "severe non-attainment" for ground level ozone by the U.S. Environmental Protection Agency.[10] This means that air quality in the region is below federal health-based standards for clean air. Motor vehicle emissions are a major contributor to ozone pollution.

- Increased levels of bicycling and walking can play an important role in reducing air pollution. By substituting a bicycling or walking trip for *short* auto trips, area residents can impact the amounts of pollutants generated by automobiles, because short auto trips produce far more pollution per mile than longer trips.[11]

- Vehicle emissions and other motor vehicle pollutants contribute to water pollution as well, which ends up in Loudoun County's streams, the Potomac River and Chesapeake Bay. Increased levels of bicycling and walking and their associated reductions in auto use and pollution will have a positive impact on local and regional water quality.

Economic Benefits

Developing trails, bikeways and walkable communities makes good economic sense for Loudoun County.

- Businesses invest in locations that have a high quality of life and corporate employers have an easier time attracting good workers to these locations. Loudoun County's ability to retain its status as a first class employment location will depend on its perception as a high quality place to live.

- Bicycle tourism is big business in the United States bringing millions of dollars in revenue to some

parts of the country. For example, in Vermont bicycle touring brings in twice as much revenue than the maple syrup industry.[12] Loudoun County has already gained national recognition for the W&OD Trail and its beautiful rolling hills, horse farm country and historic towns and villages. Bicycle tourism is part of the county economy and should become a focus of the County's tourism strategy.

- Bicycle and pedestrian access to local markets is good for business, particularly in Loudoun County's historic towns and villages.

B. Bicycle and Pedestrian Mobility as a Goal

Loudoun County has long recognized the need to provide pedestrian and bicycle friendly communities. In 1969, the Proposed Comprehensive Development Plan for Loudoun County identified the need for highways, railroads, and pedestrian areas (p. 38). In 1979, the Resource Management Plan (RMP) identified the need for an efficient transportation system emphasizing pedestrian and bicycle transportation as well as the automobile (RMP, Policy 2, p. 196).

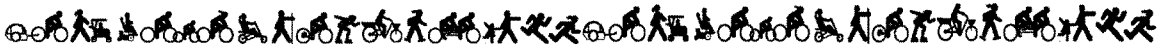
The 2001 Revised Countywide Transportation Plan (CTP) clearly and repeatedly articulates the importance of providing bicycle and pedestrian mobility. Five of the eight overall transportation strategies established by the CTP[13] directly reference non-motorized transportation. For example, strategy two states:

> *The primary objective of this transportation strategy is not to merely move motor vehicles, but to provide for the efficient movement of people and goods through a variety of travel mode choices that are safe, convenient, and affordable. The transportation system should contribute to the creation of pedestrian-friendly communities and help achieve a high-quality environment while at the same time meet the mobility and economic development needs of the County. An auto-dominated transportation infrastructure should not dominate citizens' lives or the landscape.* [14]

Moreover, many key goals established by the CTP are related to non-motorized transportation:

> *Goal 2: Establish a safe, convenient, efficient, and environmentally sound, multi-modal transportation system to serve the needs of all members of the Loudoun community and to support the County's planned growth and revitalization in its regional context.*
>
> *Goal 3: Develop a transportation system that encourages use of public transit and other transportation modes as effective alternatives to single-occupancy vehicles.*
>
> *Goal 6: Work with the State to update and adapt its roadway design standards to be consistent with the economic, social environmental and other quality-of –life goals of the County as well as improve the safety and efficiency of the transportation system.*
>
> *Goal 7: Reduce the impact of inter-county traffic on existing communities through the implementation of traffic calming or other measures.*
>
> *Goal 12: Reduce vehicle emissions by a) reducing average per capita vehicle miles traveled by 20 percent ...and c) reducing average per capita number of vehicle trips...* [15]

Bicycle and pedestrian mobility are recognized by the CTP as an important element of the multi-modal transportation network as well as the travel demand management strategies. It is also important as a



component of County policy to ensure clean air and water, respect valued rural, historic and environmental landscapes, provide transportation choice for everyone, including persons with disabilities, and create walkable and mixed-use communities.

A number of other plans have identified the need for pedestrians and cyclists to be considered in the design of projects including:

- Eastern Loudoun Area Management Plan (1980),
- Leesburg Area Management Plan (1982),
- Dulles North Area Management Plan (1985),
- Waterford Area Management Plan (1987),
- Choices and Changes General Plan (1991),
- Dulles South Area Management Plan (1993),
- Comprehensive Plan Amendment (CPAM) 1992-0010, Greenways and Trails Policies (1994),
- Purcellville Urban Growth Area Management Plan (1995),
- Toll Road Plan (1995),
- Revised General Plan (2001).

C. Existing Regulatory Requirements in Loudoun County

Current regulatory requirements pertaining to pedestrian and bicycle access are outlined in the 2003 Revised 1993 Zoning Ordinance and the Facilities Standards Manual (FSM). Both documents influence the design of new development.

Zoning Ordinance. Several zoning districts within the Revised 1993 Zoning Ordinance require the provision of pedestrian and bicycle access. For example, the Rural Commercial (RC) and PD-RV (Planned Development-Rural Commercial) zoning districts call for the promotion of pedestrian travel rather than motor vehicle use. Several residential zoning districts require that active recreation space be accessible via pedestrian walkways to all residents and, in some cases, that pedestrian linkages be provided to nearby existing or planned employment centers, shopping, or other community support services. Several commercial districts call for transportation and pedestrian access to be designed to avoid conflicts between pedestrians and vehicular traffic.

The PD-TREC (Transit Related Employment Center) and the PD-TRC (Transit Related Center) zoning districts call for the provision of pedestrian, bicycle, and vehicle connections between the different land uses and planned or existing transit stops and transit parking within the district. Pedestrian connections shall be designed to ensure the shortest most direct route possible from point to point. Similarly, the PD-TC (Planned Development-Town Center) zoning district calls for pedestrian linkages within the Town Center and between the Town Center and surrounding neighborhoods or activity centers.

Facilities Standards Manual (FSM). The FSM establishes technical standards for many elements of development projects, including pedestrian and bicycle accommodations. The FSM sets standards for the width of sidewalks and trails as well as construction materials and practices. Additionally, the FSM requires that new development projects include study and mitigation of traffic impacts to the surrounding area. Bicycle accommodations are to be provided in accordance with the policies and identified locations in the Revised

General Plan and CTP and must conform to accepted national standards established by the American Association of State Highway and Transportation Officials..

In addition to regulations, there are several active bicycle/pedestrian projects in the County:

- Development of a new multi-use trail from Purcellville to Round Hill,
- Implementation, in conjunction with VDOT, of the "Route 50 Traffic Calming Project," a community-based, long-term strategy for managing traffic on Route 50 between Route 15 and Middleburg, and
- Planning for the Waterford "Bury the Wires and Tame the Traffic" project., a community-based effort to bury overhead utility lines and implement traffic calming strategies that will contribute to better pedestrian access.

D. Regional Context

Transportation systems, and associated impacts, are important on a regional scale. Air quality is degraded by the way the *regional* transportation system functions; useful connectivity is only achieved if the *regional* network is well designed. The Washington Metropolitan region's transportation system, including bicycle and pedestrian plans, are the result of both individual state and local efforts as well as attempts at regional coordination.

The adoption of this Plan contributes to regional efforts to improve walking and bicycling conditions throughout the Washington

metropolitan area. The following efforts were either in progress or recently completed during development of the Loudoun Plan:

- **Northern Virginia Regional Bikeways and Trails Study** - This Virginia Department of Transportation study will identify a regional network of roads for bikeway development in Fairfax County, Prince William County, Loudoun County, Arlington County and the City of Alexandria.
- **Maryland Statewide 20-Year Bicycle and Pedestrian Plan** - Maryland DOT completed a 20-year statewide bicycle and pedestrian plan in 2002. It includes recommendations to provide pedestrian and bicycle access across Potomac River bridges when they are upgraded.

- **District of Columbia Bicycle Master Plan** – The DC Department of Transportation initiated this update of a plan completed in the late 1980s. At the center of the region, the District's effort to identify locations for future bike lanes , as well as a variety of policies and programs to support bicycling, are a key element of regional connectivity.

- **Arlington County** – Arlington County updated its Bicycle Transportation Plan in 1994, and has installed 12 miles of bike lanes (with plans to install an additional 10 miles in 2003). Arlington County is also in the process of revisiting its functional classification system for roadways in order to accommodate pedestrians and to encourage slower vehicle speeds on arterials.

City of Alexandria - The City of Alexandria developed its Bicycle Transportation and Multi-Use Trail Master Plan in 1998 and has installed several miles of sidewalks, trails and bikeways in the past five years.

- **Fairfax County** - Fairfax County's Countywide Trails Plan (2002) identifies the general location of proposed public trails for non-motorized users.

- **Fauquier County** - Fauquier County adopted the Fauquier County Preliminary Bicycle and Pedestrian Facility Assessment Plan in 2001.

- **Frederick County** – The Frederick County Parks and Recreation Department is developing several off-road trails in Winchester.

- **The National Capital Region Transportation Planning Board** supports a technical subcommittee that focuses strictly on bicycle and pedestrian goals and concerns for the region.

E. Scope and Objectives

The Revised General Plan and CTP establish the overarching objectives of the Bicycle and Pedestrian Mobility Master Plan – to identify a network that provides countywide connectivity and recognizes the need for careful and flexible facility design to meet the needs of many types of bicyclists and pedestrians. Particular objectives of the Revised General Plan and CTP include the following:

- Establishment of a Citizens' Advisory Committee to guide development of a the Plan
- Identification of a comprehensive system of bikeways and walkways
- Policy framework that supports coordination of development proposals and therefore connectivity of emerging neighborhoods
- Policy framework that ensures the integration of bicycle and pedestrian facilities into the road and transit networks
- Strategies for supporting rural tourism associated with bicycling in the County
- Bicycle and pedestrian access to residential, office, institutional, civic and retail destinations (including schools, universities, shopping centers, employment centers, parks, libraries, community centers, and other heavily visited public buildings) in suburban neighborhoods. Schools, in particular, need to be well served by bicycle and pedestrian facilities
- Coordination with towns, and integration of the countywide network with those in towns, villages and large neighborhoods
- The development of this Plan included the following activities:
- Analysis of existing conditions,
- Identification of opportunities and constraints,
- Public involvement,
- Collaboration with local law enforcement on safety and security issues,
- Collaboration with the School Board on school access and education issues,
- Development of recommended changes to roadway and development policies and regulations,
- Identification of facility development priorities and recommending funding strategies, and
- Development of implementation strategies.

Public Outreach Activities

Citizen Advisory Committee

June 2002 -- Public invited to participate.
July 2002 – CAC members appointed by the Board of Supervisors.
Aug. 2002 – CAC begins regular meetings.

Public Outreach Workshops

Round 1

October 1 - Eastern Loudoun
November 13 – Western Loudoun

Ongoing Public Outreach

October – December 2002
(CAC compiled and activated public outreach database)
Project Website is created.

Public Presentations of Draft Plan

Round 2

March 4, 2003 – Western Loudoun
March 5, 2003 - Eastern Loudoun

F. The Planning Process

The Board of Supervisors directed that a planning process grounded in careful research and extensive public participation form the foundation of the Plan. An experienced project team of staff and consultants was assigned to conduct research on potential policy directions and current conditions for bicycling and walking in Loudoun. A Citizens' Advisory Committee (CAC) was appointed to guide this effort and to ensure that the needs of Loudoun residents, broadly defined, would be addressed by a final plan.

The Citizens' Advisory Committee

The CTP directed consideration of the formation of a CAC that would recommend "location and design of facilities for inclusion in the Countywide Bicycle and Pedestrian Mobility Master Plan."[16] The Board of Supervisors appointed a 20-member CAC in June, 2002, with a specific mission: *"to identify project goals and objectives, bicycle and pedestrian mobility issues, specific problem locations, solutions, the ultimate planned network, and priority projects."*[17] [move reformatted chart to end of section]

The CAC was extremely active during the 9-month planning process. The group met 18 times to guide research, discuss policy options, develop the recommendations of this Plan, and to ensure effective public outreach. To focus the Committee's efforts efficiently, two subcommittees were formed – Vision and Goals, and Outreach. Both subcommittees took on specific tasks during the planning process.

The Interdepartmental Advisory Team

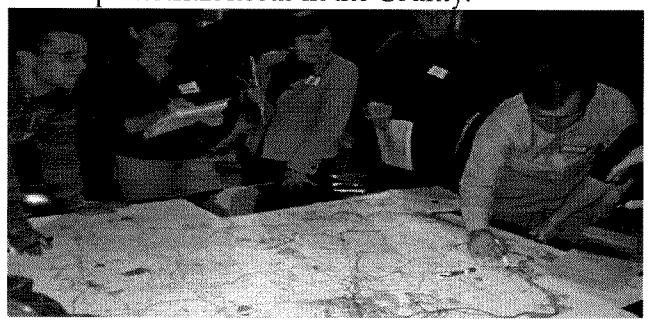
During the research and planning phase, the Loudoun County Planning Department convened a staff team of representatives from a variety of County agencies to review policy options and support research. Participating agencies included the Office of Transportation Services, the Department of Parks and Recreation, the Department of General Services, the Sheriff's Office, the Department of Building and Development, the Office of Mapping and Geographic Information, the Public Information Office, the Department of Economic Development, Loudoun County Public Schools, the Department of Fire and Rescue, and the Virginia Department of Transportation.

During development of the plan, input from incorporated Towns was actively sought, and other independent agencies including the Loudoun Convention and Visitors' Association, the Loudoun Museum, and the Northern Virginia Regional Park Authority were consulted.

Public Participation

Active public participation was a key component of this Plan. The planning process included a number of strategies to encourage significant and meaningful public involvement:

- The CAC was appointed by the Board of Supervisors to represent Loudoun communities and to guide development of the plan and lead public outreach efforts;
- Two rounds of public workshops and meetings were conducted, during which participants were actively involved in identifying bicycle and pedestrian needs in the County.



- The County website was used to gather public comments and share information as the plan was developed.

- Media outreach was used to facilitate press coverage and alert the public to the process.

- The CAC developed and implemented its own public outreach strategy. This strategy included establishment of the Outreach Subcommittee as well as procedures for disseminating information electronically to a carefully developed list of citizens, local and regional organizations. The CAC facilitated two-way communication by getting information to the public and receiving public comments.

G. Conclusion

The Loudoun County Bicycle and Pedestrian Mobility Master Plan has grown out of public concern for bicycling and walking and recognition that they must be addressed first and foremost as a part of transportation policy, planning and system development. The remainder of this Plan describes how to do that.

- Chapter 2 outlines a *Vision* for Loudoun's bicycle and pedestrian network and identifies five key goals that form the foundation of this vision.

- Chapter 3 describes existing conditions, including current levels of bicycling and walking, the extent of existing facilities, and a detailed analysis of bicycling and pedestrian conditions on Loudoun's roadway network.

- Chapter 4 outlines the recommended policy framework that will be needed to improve bicycling and walking conditions and provide a safe and effective bikeway and walkway network. It addresses roadway design policies, facility selection, land development policies, transit system development policy and network maintenance and management.

- Chapter 5 describes the proposed network of primary bikeways and walkways and refers to two maps, which can be found in the map pocket at the end of this document.

- Chapter 6 describes recommended education and safety programs.

- Chapter 7 proposes an overall institutional framework for the bicycle and pedestrian program.

- Chapter 8 addresses funding strategies.

- Chapter 9 provides a guide for plan implementation.

Chapter 2: Vision and Goals

The Citizens' Advisory Committee developed the following vision statement and a set of goals for bicycling and walking in Loudoun County. The following vision statement will guide implementation of this Plan and all County policy and actions related to bicycling and walking:

Vision Statement

Loudoun County – a place where pedestrians and bicyclists of all abilities have a safe, secure, and convenient alternative transportation network of walkways and bikeways that enable everyone to move efficiently to and from such places as work, school, transit, shopping, libraries, parks and recreation.

In essence, this Plan envisions a future transportation system that accommodates bicycles and pedestrians with the same level of comfort and convenience as automobile travel. This system will provide equal access for people who want to travel as pedestrians or by bicycle.

A. Goals and Objectives

To realize this vision the Committee established five primary goals, with associated objectives for each. They are described below:

CONNECTIVITY

GOAL: Develop a comprehensive walkway, bikeway and shared-use path network among residential neighborhoods, Towns, workplaces, shopping centers, transit stations, historic districts, schools, libraries, recreation centers, parks, etc.

This goal addresses the need for a seamless network of pedestrian and bicycle connections. While many miles of sidewalks and trails exist throughout the County, they often end at major barriers or do not connect to nearby destinations.

- OBJECTIVE A: Expand the bicycle and pedestrian network of bikeways, walkways, shared roads and other facilities throughout the county to connect developments, neighborhoods, towns, and adjacent counties and states.
- OBJECTIVE B: Incorporate requirements for walkways, bikeways and shared-use paths into all community design and modifications, and transportation activities.
- OBJECTIVE C: Expand connections of walkways, bikeways and shared-use pathways to mass transit in order to promote the use of both.

DIVERSE USERS

GOAL: Accommodate the widest possible range of use abilities.

Facilities for pedestrians and bicyclists should be designed to accommodate a wide variety of users, including people with disabilities. In the objectives below, a variety of groups are identified as the primary users of the proposed bicycle and pedestrian network. It should be noted that due to this Plan's primary focus on transportation, recreational walking activities as well as hiking and horseback riding are not specifically addressed.

- OBJECTIVE A: Provide for the needs of bicyclists, pedestrians (walkers, joggers, runners), in-line skaters, disabled persons, children, the elderly, people pushing strollers, and tourists.
- OBJECTIVE B: Develop policies that address diverse user needs.

EDUCATION & PROMOTION

GOAL: Educate public officials, business and community leaders and the general public.

This goal addresses the need for community leaders and the general public to have a greater level of awareness of the importance of bicycling and walking as alternative modes of transportation.

- OBJECTIVE A: Establish a permanent county advisory committee for pedestrian and bicycling advocacy.
- OBJECTIVE B: Educate public officials, business and community leaders, and the general public about the values and benefits of bicycle and pedestrian facilities, and associated efforts.
- OBJECTIVE C: Promote walkways, bikeways and shared-use paths and related facilities among county residents and tourists.
- OBJECTIVE D: Promote mass transit that supports the use of walkways, bikeways and shared-use paths.

SAFETY AND SECURITY

GOAL: Increase the levels of bicyclist and pedestrian safety and security.

Safety and security are important goals of the Plan. New bikeways and walkways should be designed to enhance the safety of all users, and residents should have opportunities to learn safer walking, bicycling and driving techniques. This is especially important for children who will use the future network.

- OBJECTIVE A: Incorporate safety and security related design standards for roads, walkways, bikeways and shared-use paths.
- OBJECTIVE B: Educate the public about safe walking, bicycling, and driving rules and practices.
- OBJECTIVE C: Increase safety measures along walkways, bikeways and shared-use paths.
- OBJECTIVE D: Improve signs for pedestrians, bicyclists, and motorists in shared environments.
- OBJECTIVE E: Strengthen laws and other policies to better protect pedestrians and bicyclists.
- OBJECTIVE F: Improve enforcement of laws concerning the safe interaction of pedestrians, bicyclists, and motorists in shared environments.

FUNDING FOR CONSTRUCTION & MAINTENANCE

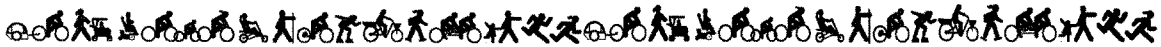
GOAL: Ensure adequate funding for construction and maintenance of the pedestrian and bicycle network and related facilities.

This goal addresses the need to provide adequate funding to build a seamless network of facilities, and to maintain this network in the future.

- OBJECTIVE A: Develop sustaining budget and finance programs for construction and maintenance of walkways, bikeways and related facilities.
- OBJECTIVE B: Clarify jurisdiction and responsibility issues among town, county, regional, and state organizations.
- OBJECTIVE C: Obtain funding from sources outside the County for pedestrian and bicycling improvements.
- OBJECTIVE D: Encourage volunteer projects that make pedestrian and bicycling improvements.
- OBJECTIVE E: Design for low maintenance.
- OBJECTIVE F: Encourage homeowners' associations to adequately maintain community trails.
- OBJECTIVE G: Maintain a current assessment of network and facility conditions and report status to the Board of Supervisors annually.

B. Conclusion

Loudoun County's vision for bicycling and walking provides the public, elected officials, county staff, and others a clear picture of the future for bicycling and walking. The goals reflect priorities that were identified during the planning process. Together they provide a solid framework for the recommended policies and actions in this Plan.



Chapter 3: Existing Conditions

A. Overview

Loudoun County is located in the northern Piedmont and Blue Ridge physiographic provinces of Virginia. The area east of Route 15 and the Catoctin Ridge is in the northern Piedmont Culpeper Basin and is characterized by level terrain. The western part of the County lies within the Blue Ridge province and is characterized by gently to strongly sloping terrain. The county is bounded on the north and east by the Potomac River, and the western edge is defined by the Blue Ridge, the first major ridge of the Appalachian Mountains.

Between 1990 and 2000, Loudoun County was the fastest growing county in Virginia and among the fastest in the nation. Population increased from 86,000 to 170,000, a growth rate of 97%. The population topped 200,000 by 2003. Fast-paced residential and commercial development, especially in eastern Loudoun around the Dulles International Airport and along the Dulles Greenway has accompanied this frantic population growth.

Loudoun's scenic farm country and historic small towns have long attracted recreational bicyclists and other tourists interested in weekend getaways, antique shopping and exploring civil war history. The W&OD trail is one of the oldest and longest rail-trails in the nation, connecting Washington, DC, at the heart of the metropolitan area with its exurban fringe. As a conduit to the scenic country roads and rural settlements, it has become a favorite for families and serious cyclists alike. Loudoun County is also bounded by two other major long distance trails -- the Appalachian Trail, which runs along its western boundary; and the C&O Canal Towpath, which is on the Maryland side of the Potomac River. These nationally recognized hiking and biking trails draw tens of thousands of people annually.

B. Current Levels of Bicycling and Walking

Census data provide some information about the current levels of bicycling and walking in Loudoun County. These data represent journey to work trips--20 percent of all trips. In Loudoun County, the average number of pedestrian and bicycle commuting trips is low-approximately 1.35 percent of all trips, compared to the percentage of people who drive alone in an automobile to and from work (82 percent). As shown in Table 1, Loudoun is well below the national bicycle and pedestrian commuting rates and below the average for Virginia as a whole.

Table 3-1: Bicycle Commuting and Walk-to-Work Rates
Source: U.S. Census 2000 (Journey to Work)

Jurisdiction	Commute by Bike	Walk to Work	Combined Bike & Pedestrian	Total B/P Work Trips
United States	0.4 %	2.9 %	3.3 %	4,247,479
Virginia (Statewide)	0.2 %	2.3 %	2.5 %	88,417
Loudoun County	0.1 %	1.2 %	1.3 %	1,243
Fairfax County	.1 %	1.3 %	1.4 %	7,632
Arlington County	.7 %	5.6 %	6.3 %	7,278
Chesterfield County	.05 %	.8 %	.85 %	1,063

Rates of student bicycling and walking to school in Loudoun County are also low. Eighty percent of the 40,000 students that attend public schools are eligible for bus service to and from school. Of the 20 percent who live close enough to bike or walk to school, school officials estimate that more than half are frequently dropped off from automobiles driven by guardians, or use duplicative bus service that is provided in some safe walk zones. Generally, about 50 percent of high school juniors and seniors drive to school or ride with a fellow student .[18]

C. Existing Bicycle and Pedestrian Facilities

Long Distance Trails

Loudoun County is home to or in close proximity to three of the nation's most notable long distance trails: the Washington and Old Dominion (W&OD) Trail, the Appalachian Trail and the Chesapeake and Ohio (C&O) Canal Towpath.

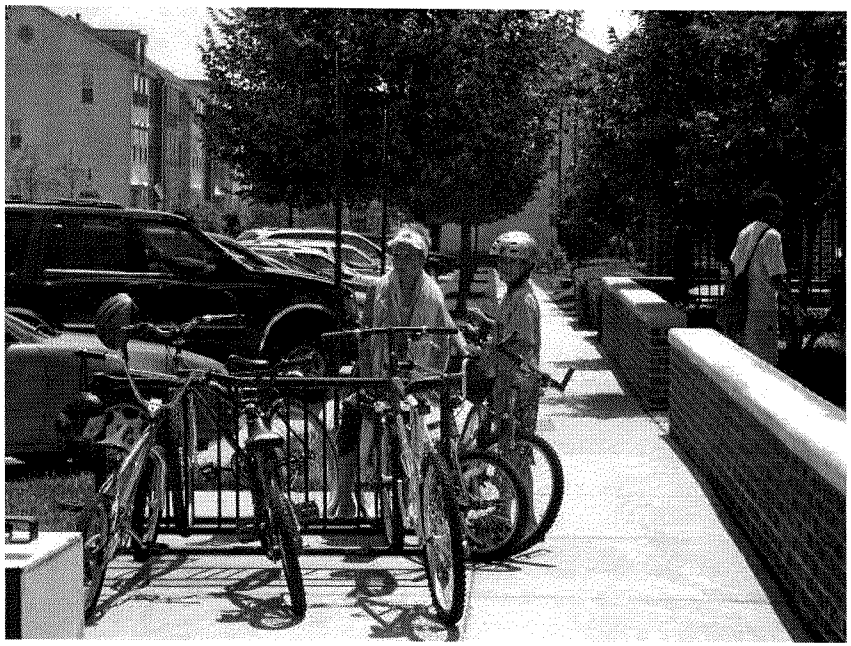
- Over its entire length, the W&OD Trail receives 2-3 million visitors a year. This trail is a considerable transportation resource - it is used by bike commuters to get to and from work, as well as by school children to get to schools (see Farmwell Station Middle School case study in Appendix G). A 1998 study of the W&OD Trail found that twelve percent of trail users on the W&OD use the trail for regular or periodic transportation purposes.[19]

- The C&O Canal is a popular recreational resource and can be accessed via White's Ferry near Leesburg. It can also be accessed from three highway bridges that cross the Potomac into Maryland; however none of these bridges provide adequate bicycle or pedestrian accommodations. Linkages to the Towpath, including access to White's Ferry, are in need of improvement.

- While the Appalachian Trail is strictly a hiking trail, interest in improving access to it via connecting roads and trails was mentioned frequently during public meetings.

Neighborhood Bicycle and Pedestrian Networks

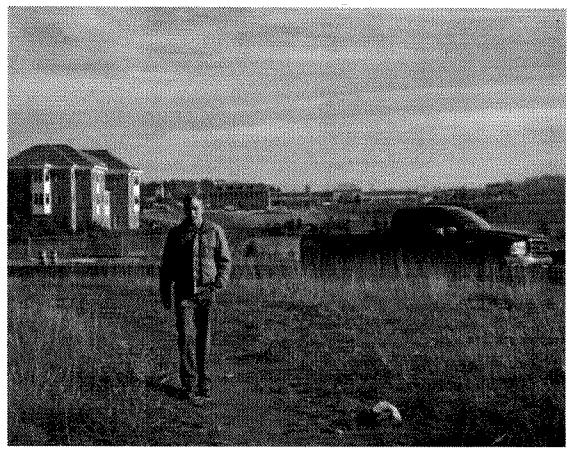
In recent years, Loudoun County has required residential and commercial development to include sidewalks or shared use pathways, or to reserve land for future pathways. In some of the newer suburban residential subdivisions, particularly those developed in the neo-traditional style (e.g. South Riding), the sidewalk system is well designed for walking. The Sugarland Run community is an example of a development that provided for internal pedestrian circulation using an extensive pathway system and fewer traditional sidewalks; street crossings are a problem in this community. A key challenge is to improve these systems by improving connectivity within neighborhoods or to destinations outside of the immediate neighborhoods.



Facilities Along Roadways

Loudoun County offers few bikeways, walkways or shared use facilities along roadways. There are no bike lanes in the County and no signed bike routes. Paved shoulders are rare. The width and layout of most neighborhood pathway systems is adequate for walking and jogging, but too narrow for shared use with bicyclists and in-line skaters.

An analysis of 842 miles of roadway included all of the roads in the CTP and 70 miles of shared use pathway alongside roadways in the County. The analysis did not include the W&OD Trail. Of those 70 miles of pathway, only 12 miles are wide enough to safely support shared bicycle and pedestrian use (eight feet or wider). Only 13.8 percent of the road mileage studied included sidewalks. On many of these roads, sidewalks are provided on one side only, or are discontinuous along the entire length of the road. [20]



Sidewalks are often missing

D. Barriers to Bicycling and Walking

Barriers to bicycling and walking in Loudoun County are both natural and man-made. The primary natural impediments are the Potomac River, a number of mountain ridges including Short Hill Mountains, Catoctin Mountains and the Blue Ridge along the Loudoun/West Virginia border. Additionally, the County has a number of large creeks and important stream valleys including Sugarland Run, Broad Run, Goose Creek, and Catoctin Creek that have limited numbers of bridge crossings.

Man-made barriers are also significant. Primary among them are Dulles International Airport, the Dulles Greenway (Route 267), US 15, US 50, Route 28, Route 7 and the 7 & 15 Bypasses around Leesburg. Loudoun County has very few grade-separated crossings (bridge overpasses or underpasses) over its major arterial highways and freeways. As roads like Routes 7, 28 and 50 have rapidly grown in width, traffic speed and volume, pedestrian and bicycle crossings have become extremely difficult, even at signalized intersections.

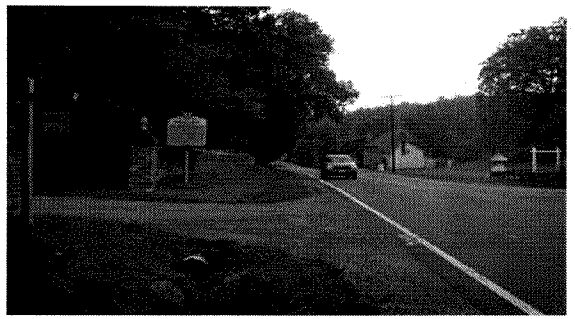
At the Countywide level, the large size of some barriers and the existence of few routes around them sometimes combine to create significant barriers for bicyclists who are interested in traveling longer distances. Frequently there are only one or two roads that make the link and they may be circuitous and have poor bike accommodations. For example: Harper's Ferry Road is fairly isolated from the rest of the County by Short Hill Mountain; South Riding is isolated by Dulles International Airport; Ashburn is bounded by high-speed, high-volume roads (Belmont Ridge Rd., Route 267 and Route 7); and Routes 15 and 50 provide the only connection between Leesburg and Middleburg.

Interchanges where arterial roads cross limited access freeways are also barriers to bicycling and walking. Along Cascades Parkway, bicycle and pedestrian access is not provided at the Route 7 interchange, nor is access provided where major arterials intersect with the Leesburg Bypass. Interchanges along the Dulles Greenway were also reported by the public to be difficult to pass through as a bicyclist or pedestrian.

Residential and commercial land development patterns that were common in the past have also created considerable barriers to bicycling and walking. Frequently, the internal roads and neighborhood streets of residential and commercial developments do not link with those of the neighboring development, establishing each new activity node as an isolated pod. Bicycle and pedestrian trips within and between adjacent developments are made much longer and more indirect, and require use of roads with heavy traffic volumes. Moreover, many developments are designed to limit access to only one or two locations, which often provide accommodations for only motor vehicles, thus making bicycle and pedestrian access difficult.

E. Roadway Conditions for Bicyclists and Pedestrians

On the main roads that traverse the County, bicyclists and pedestrians must operate within a transportation system that is designed primarily for automobiles.



Bicycling

Most roadway cross sections do not include paved shoulders; sobicyclists must

share travel lanes with motor vehicles.

In rural western Loudoun, increased traffic volumes and travel speeds are reducing attractiveness and safety for bicyclists on many roads that, just ten years ago, provided comfortable riding conditions.

In eastern Loudoun, many new collector and arterial roads are being designed with features that are not bicycle-friendly. These features include pavement and lane widths that facilitate vehicle speeds of 50-60 mph, when posted speeds are 35-40 mph; regular use of free flow right turn lanes; clover leaf interchanges for arterial roads; and dedicated right and left turning lanes at every major intersection. Edge lane striping rarely provides a usable shoulder, and many shoulders remain unpaved. As previously noted, striping of bike lanes is not done.

While off-road sidepaths are often provided adjacent to newer developments, they are rarely designed well for bicycling; they are narrow (less than 8 feet wide), have poor pavement or surface quality, and include frequent curves and undulations that reduce their efficiency for utilitarian travel. Often they are provided only on one side of the road, and they end at the property line of the development without connections across frontage of undeveloped property or older parcels that were not designed with sidepaths.

In addition to poor roadway conditions for bicyclists, bicycle parking is lacking at most destinations, including schools, shopping centers, along traditional main streets, at parks and other public facilities such as post offices and libraries. Where bike racks are provided, they are often in short supply, hidden from view, or are not of a design that supports the frame of the bike (U-racks).

Pedestrians

The availability of sidewalks in the region varies widely. As a general rule, the larger older communities such as Leesburg, Purcellville and Sterling, have the best sidewalk systems, and the town centers are generally pedestrian-friendly. However, there are many places where neighborhoods are not connected to nearby destinations with sidewalks, even in locations where the destination is less than a quarter mile away.

Route 50 in Aldie—high speeds and lack of paved shoulders make bicycling difficult

As is the case with many older sidewalk systems, it is common to find an intersection with one or more missing curb cuts, essential for access by wheelchair, strollers, electric scooter, etc. In older communities, because street surfaces have been widened over time, utility poles,

signal control boxes, signs, trees and many other barriers share limited sidewalk space and often make passage difficult. In some areas, sidewalks have been well maintained, in others they are in need of extensive repair.

While gaps in the sidewalk system are common in both the oldest and newest communities, the newer neighborhoods are less likely to be missing curb ramps. In many places, the absence of sidewalks is highlighted by worn dirt paths indicating the presence of regular foot traffic.

There is a dearth of crosswalks in the County, and a variety of striping patterns used. Many signalized intersections do not include pedestrian crossing devices such as walk/wait signalheads, or push buttons for pedestrian activation of the signal. Still others have been designed seemingly to discourage pedestrian use—these include use of highway guiderails that block access to the corners or block medians, use of free flow right turn lanes and other features designed solely to facilitate motor vehicle flow.

School Zones

On many roads near schools, special care has been taken to install solar-powered flashing warning lights to warn motorists of the likely presence of pedestrians during school access and egress hours.

In some older communities, pedestrian tunnels have been built under major roads to provide access to schools or shopping centers. While these grade separations dramatically improve safety from traffic, many of these tunnels have drainage and erosion problems, poor sight lines, steep and narrow approaches with sharp turns, and are poorly lit and maintained. Higher standards for underpass design are needed in order to make these alternate routes safe and attractive. Improved maintenance and volunteer patrols during high use hours such as before and after school, can enhance usage.
Many schools are surrounded by high-speed, four-lane roadways that include only minimal provisions for pedestrians and no accommodations for bicyclists. In many cases students living within a walkable distance to the school must be bussed because a safe walking route is not available.

F. Level of Service

Level of service (LOS) is a term that is used in the traffic engineering discipline to refer to the average speed and travel time for motorists traveling in a particular roadway corridor. In the 1990s, new thinking and research contributed to the development of methodologies for assessing levels of service for other travel modes including bicycling, walking and transit. Specific methodologies and models for bicycle and pedestrian *level of service* have been developed and used by a number of cities and counties around the U.S. since the mid-1990s.

With the recent adoption of the Countywide Transportation Plan, Loudoun County reaffirmed its policy regarding *level of service* for motor vehicles on CTP roads. [21] This Bicycle and Pedestrian Mobility Master Plan adopts *level of service* policies and assessment methods for the bicycle and pedestrian modes as well.

When considering *level of service* in a multi-modal context, it is important to note that LOS measures for the various transportation modes (motor vehicle, pedestrian and bicycle) are based on different criteria and are calculated on different inputs. For automobiles, LOS is primarily a measure of speed, travel time and intersection delay. For bicyclists and pedestrians, LOS is a more complex calculation, which represents the level of comfort a bicyclist or pedestrian experiences.

G. Bicycle and Pedestrian Level of Service in Loudoun County

During the course of this study, Bicycle and Pedestrian Level of Service models were employed to formally evaluate bicycling and walking

conditions on more than 735 miles of Loudoun County roadways.[22] These models used measurements of roadway conditions and characteristics that were gathered specifically for this Plan in fieldwork conducted in November and December 2002.

Bicycle Level of Service (BLOS) Model

The BLOS model used is a scientifically calibrated method of evaluating the comfort level of bicyclists on a roadway segment, given existing bicycling conditions. It uses quantitative data to produce a qualitative evaluation. The data includes measurable traffic and standard roadway factors such as:

- Lateral separation between bicyclists and adjacent motor vehicle traffic (measured by the width of the right-most lane)
-
- Presence and width of a paved shoulder/bike lane
- Volume and speed of motor vehicle traffic
- Percentage of heavy trucks
- Number of travel lanes
- Presence of on-street parking
- Pavement condition (note that unpaved roads do not receive Bicycle LOS grades)

The BLOS model uses score ranges to assign a letter grade (A-F) that describes existing conditions. The BLOS grade has been scientifically calibrated to reflect actual bicyclists' perception (based on a cross section of cyclists and skill levels). Level "A" reflects the best conditions for bicyclists; level "F" represents the worst conditions.

Pedestrian Level of Service (PLOS) Model

The PLOS model assesses the comfort level of pedestrians walking along roads. It uses roadway measurements and inputs that are similar to the Bicycle Level of Service model, and an identical grading scale. It is scientifically calibrated to reflect actual user perception of comfort, however it does not take into consideration the perspectives of disabled travelers or roadway characteristics that specifically impact travelers with disabilities. The roadway characteristics used by the pedestrian model include the following:

- Sidewalk presence and sidewalk width
- Lateral separation between pedestrians and adjacent motor vehicle traffic (measured by the width of the right-most lane, the width of the bike lane or paved shoulder (if present), and the width of the buffer between the roadway and the sidewalk (if present))
- Volume and speed of motor vehicle traffic
- Number of travel lanes
- Presence of on-street parking
- Presence of street trees and spacing between street trees

The Study Network

To ensure the most useful results from a level of service analysis, a study network of 842 miles was recommended by the consultant team and approved by the Citizens' Advisory Committee and County Staff. The network included all CTP roads (both paved and unpaved, as well as those that are planned but unbuilt), and a significant number of other roads based on the connectivity and access that they provide to the primary road system. Most short residential streets and roads were not included. Also, limited access roadways, where bicyclists and pedestrians are not allowed by law, were not included in the study network. A map of the network is provided in the map pocket (see Pedestrian Level of Service Map). A summary, by category of road is provided in the Table below.

Table 3-2: LOS Study Network for Loudoun County

Category of Roadway Type	Miles	Percent of Miles
Total Study Network	842.0	100.0 %
CTP Roadway Network	480.7	57.0 %
Total Network with BLOS Grade	573.8	68.1 %
Total Network with PLOS Grade	735.7	87.4 %
Unpaved Roadways	161.9	19.2 %
Future Roadways	106.3	12.6 %

Note: percentages do not add up to 100 percent because of overlap within the categories.

H. Level of Service Results for Bicyclists and Pedestrians

Table 3-3 shows Bicycle Level of Service results for Loudoun County roadways. The total mileage of roads receiving BLOS grades included 573 miles in the overall study network and 355 miles of existing CTP roads.[23] Almost half of all roads studied in Loudoun County (49%) have a Bicycle Level of Service "D"or worse and over two-thirds of CTP roads have a BLOS "D" or worse.

These findings confirm what was generally observed when evaluating the County's roadways for bicycling conditions: that most roads are not bicycle-friendly. The data also confirms that the primary factors contributing to these conditions are a lack of roadway space for bicyclists to use, and high traffic volumes and travel speeds in many major corridors. Heavy truck volumes on some roads also play a role in reducing the level of comfort for bicyclists.

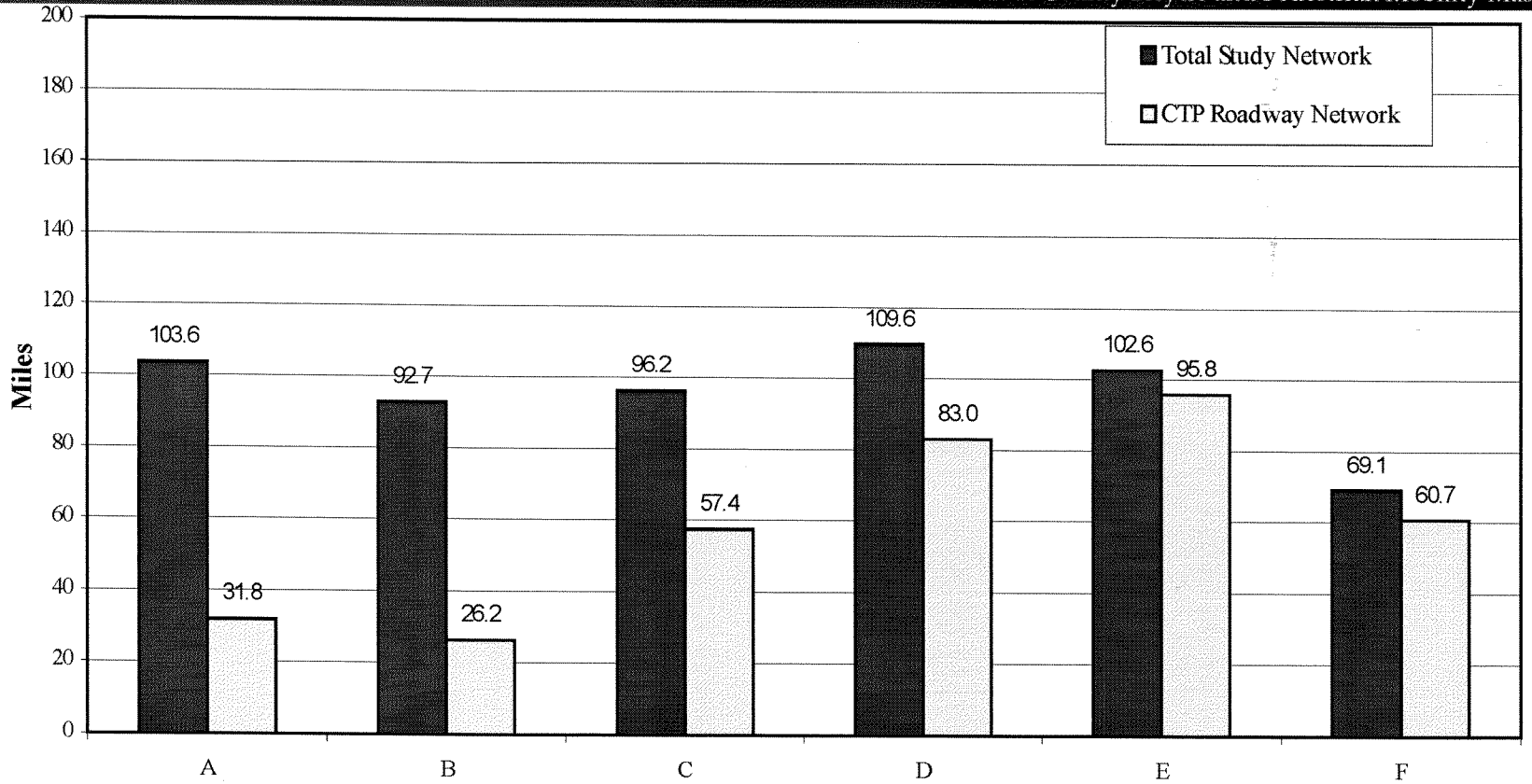


Table 3-3: Bicycle Level of Service Grade

Table 3-4 shows Pedestrian Level of Service results. The total mileage of roads receiving PLOS grades included 735 miles of roadway; with 376 miles designated as CTP roads.[24] More than three-quarters of Loudoun County's roads have a pedestrian level of service "D" or worse and 83% of CTP roads have a PLOS of "D" or worse.

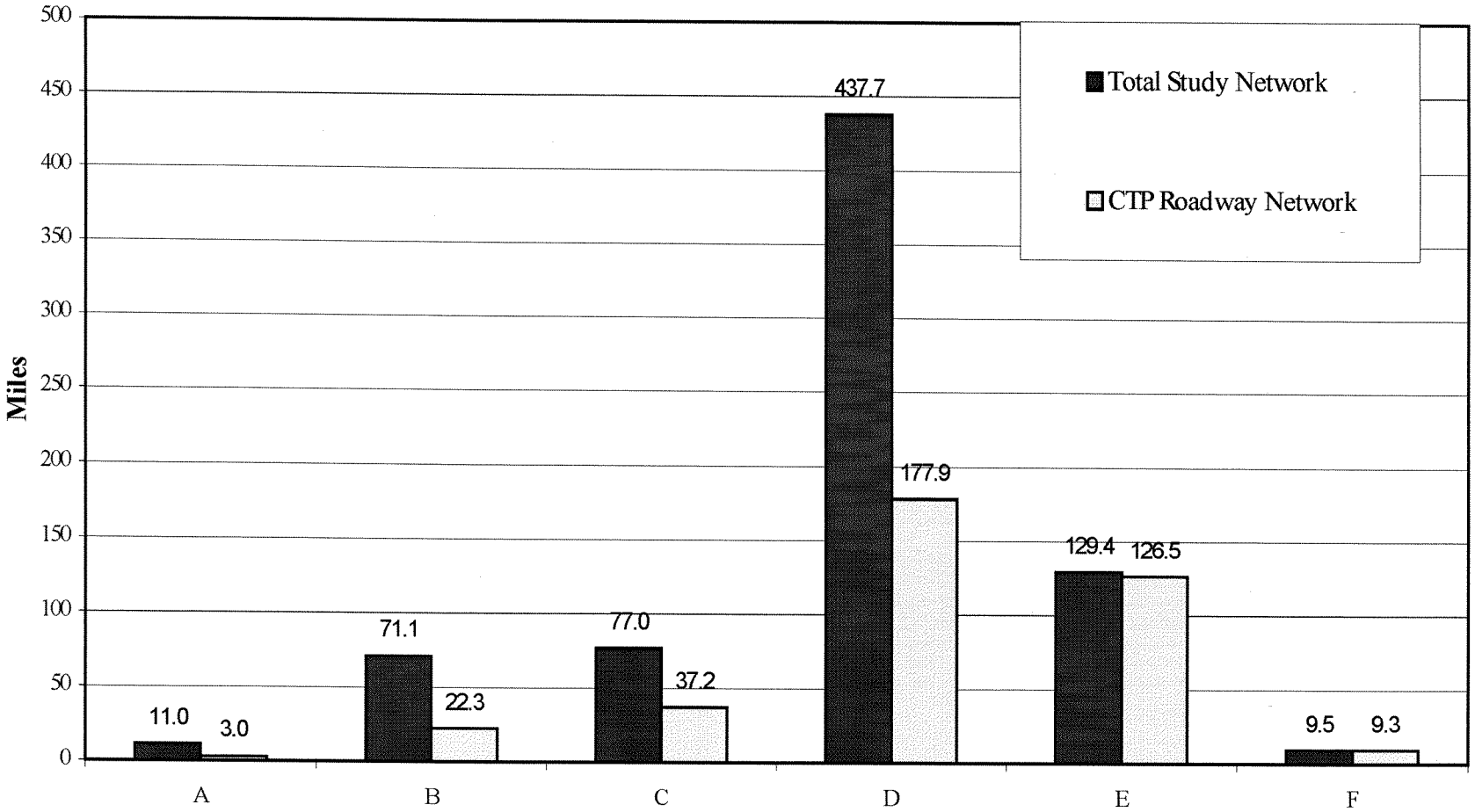


Table 3-4: Pedestrian Level of Service Grade

These findings confirm what was generally observed when evaluating the County's roadways for pedestrian conditions: that most roads do not accommodate pedestrians well. The data also confirms that the primary factors contributing to these conditions are a lack of sidewalks (or shoulders on rural roads), minimal use of buffers and street trees, and high traffic volumes and travel speeds on many major roadways.

I. Conclusion

The level of service analyses conducted for this Plan confirm the comments made by numerous residents and elected officials who attended public meetings held during the planning process, that "there is a great need to improve bicycling and walking conditions throughout Loudoun County." While unsuitable conditions may not be the only factor, certainly, these conditions contribute to Loudoun's low levels of bicycle and pedestrian commuting, as well as under utilization of bicycle and pedestrian modes and trail facilities for other trip making purposes.

The evidence gathered in this planning process suggests that County residents would like more opportunities to bicycle and walk for transportation, more and safer places for recreational riding and walking, and the opportunity to avoid having to drive to their recreational bicycling and walking destinations.

Chapter 4: Recommended Policies and Guidelines

This chapter recommends comprehensive policies regarding incorporation of bikeways, walkways and other facilities into transportation and development projects in Loudoun County. These policies are critical to the implementation of this Plan. A comprehensive set of policies is needed to facilitate development of a functional bicycle and pedestrian network. Policies in the chapter address the following:

- Roadway design,
- Land development
- Transit planning and operations,
- School access,
- Park access, and
- Facility maintenance and management.

The Level of Service Approach

To ensure flexibility in facility design, the County will employ level of service performance minimums which can be met using a variety of roadway designs. Moreover, the County recognizes that the same level of service is not required in every situation or location, because significant constraints can prevent the recommended level of service from being feasible.

Table 4-2 provides a quick reference to seven conditions to which level of service minimums apply. Appendix F provides a more detailed description of each of these conditions as well as what exceptions to the minimums may be acceptable. Appendix F is organized to provide answers to the following questions: 1) "In what cases do level of service standards apply?" and 2) "On what roads do level of service standards apply?"

Loudoun's Level of Service Minimums are designed to achieve the following objectives:

- Ensure that the newest roads and communities built in the County have the highest quality bicycling and walking conditions;
- Ensure that bicycle and pedestrian conditions are improved when existing roads are upgraded;
- Ensure that conditions near and within the walk zones of schools are adequate to encourage safe bicycle and pedestrian access for students and others;
- Provide high quality bicycling conditions to the greatest extent possible in rural areas;
- Protect and accommodate bicyclists and pedestrians in rural communities, especially in the villages.

The Citizens' Advisory Committee spent considerable time studying the level of service concept and evaluated more than one bicycle and pedestrian level of service model. The Committee determined that the models selected for this Plan would provide Loudoun County with a sound methodology upon which to base policy, and would provide credible and effective tools for evaluating the comfort level of bicyclists and pedestrians on both existing and future roadway segments.

A. Roadway Planning and Design Policy

To ensure that new roadways are planned and developed as multi-modal facilities, consistent with the CTP, new design policies are needed. The following policies shall be applied during transportation project and program development:

1. Transportation facilities in Loudoun County (with the exception of limited access freeways) will be planned, designed, constructed and maintained to accommodate shared use by motor vehicles, bicycles and pedestrians.[25]

2. Minimum Bicycle and Pedestrian Levels of Service, set forth in Table 2, and further described in Appendix F, shall govern all roadway improvements and development projects.

3. Pedestrian and bicycle safety will be of paramount concern on all projects where such access is permitted.

4. Construction of new highways, intersections or major highway improvements shall not sever or eliminate existing bicycle and or pedestrian access routes without providing the same or improved access using safe and convenient accommodations.

5. The County will develop procedures, and revise the Facilities Standards Manual, zoning and subdivision ordinances accordingly, for applying the LOS standards as an element of Traffic Impact Analyses.

6. The County shall develop and maintain a Design Toolkit as a resource for land and transportation planners.

7. The County shall encourage VDOT to integrate the policies of this Plan into its roadway planning and design in Loudoun County.

Implementing these policies benefits pedestrians and bicyclists and improves conditions for motorists, since fewer vehicles on the road means less traffic congestion.

Transportation Project Development

Pedestrian and bicycle facilities should provide satisfactory linkages and contribute to system connectivity throughout the County. The County will work proactively with VDOT and the development community to facilitate a design approach that successfully addresses the needs of non-motorized roadway users at all stages of project development.

The County will facilitate creative approaches to providing an excellent network for bicyclists and pedestrians. Design requirements should not be rigid, but should allow the system to respond to existing conditions and constraints in a cost-effective manner that yields a safe outcome.

Algonkian Parkway

Transportation Project Development Policies

1. Project scoping shall include identification of missing sidewalks, sidewalk gaps, and needed walkway and bikeway connections. Scoping will require a basic field observation to identify pedestrian and bicycle needs. It may be necessary to extend project boundaries to provide continuity to logical terminal points.

2. The County shall require land development proposals to include bicycle and pedestrian design and development program that is consistent with national guidelines, including the AASHTO Guide for the Development of Bicycle Facilities, the Americans with Disabilities Act Accessibility Guidelines (ADAAG), and the Loudoun County Bicycle and Pedestrian Facility Design Toolkit.

3. Proposed concept development plans shall include existing and proposed pedestrian and bicycle features, including sidewalk, walkway and bikeway connections, and intersection crossing safety measures. Concept plans will identify measures by which vehicle speeds will be kept to posted limits through physical measures such as traffic calming.

4. The Bicycle and Pedestrian Facility Selection Guideline (Table 4-1) and Level of Service Minimum Standards (Table 4-2) shall be used to determine and design appropriate bicycle and pedestrian accommodations to include in the project.

   Step 1. Facility Selection (see TABLE 4-1)
   The functional classification of the road under consideration, and the planning zone in which it is located, determines broadly the type of facility needed. Table 1 provides a general guideline for selecting the appropriate design treatment. For most roadway categories, on-road bicycle accommodations are recommended. There are a number of alternative designs for on-road bikeways (see shadow box on page 39). In order to determine what level of on-road accommodation is needed, it is necessary to determine the desired performance of the facility.

   Step 2. Design for Target LOS (see TABLE 4-2)
   The next step is to determine the quality of accommodation that is desired for the roadway under consideration. Given some basic roadway characteristics, the designer determines the width needed for a bike lane or paved shoulder and/or the amount of separation needed between a path/sidewalk and the adjacent road. If the road is a short residential street or secondary road with low traffic volumes, there may be no need for a "designated" bicycle facility in order to achieve the desired level of accommodation.

5. Use of emerging bicycle and pedestrian design techniques, not yet recognized in existing guidelines shall be considered on a demonstration basis as is appropriate and applicable to the particular project.

6. Roadway construction traffic control plans shall include maintenance of an accessible pedestrian and bicycle route through the construction site whenever an existing route is disrupted.

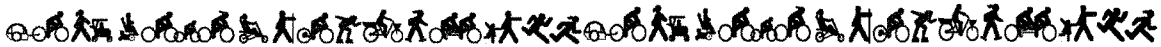
Table 4-1: Bicycle and Pedestrian Facility Selection Guidelines

Secondary Road	Minor Collector	Major Collector	Major Collector	Minor Arterial	Principal Arterial	Limited Access
Ex: Sugarland Run Dr. Rt 722 2 lane	Ex: Ashburn Rd, Cochran Mill Road 2 lane or multi-lane	Ex: Snickerville Rd, Clarke's Gap 2 lane	Ex: Atlantic Blvd., Potomac View, Sterling multi-lanes	Ex: Ryan Rd., Belmont Ridge Rd. 2 lane or multi-lane	Ex: Rt. 7 Rt. 50 4-6 lane	Ex. Dulles Greenway Rt. 28
On-Road Bicycle Accommodation + Sidewalks[1]			**On-Road Bicycle Accommodation + Off-Road Shared Use Path and Sidewalk[1]**		**Off-Road Shared Use Path**	**Off-Road Shared Use Path, as permittd by state statutes.**
See Design Toolkit for Typical Cross Sections						
See cross sections for each roadway type; use target Bicycle LOS and Pedestrian LOS to determine facility design.			**See cross sections for each roadway type; use target Bicycle LOS and Pedestrian LOS to determine facility design.**		**See cross section for roadway type, use target Ped LOS to determine the characteristics of facility separation.**	

[1] Sidewalks shall be provided on both sides in Suburban Policy Areas, Transitioning Policy Areas, Joint Management Areas, and where feasible in Villages in the Rural Policy Area. Sidewalks will not typically be provided along rural road sections with no or few adjacent housing units.

Table 4-2: Loudoun County Bicycle and Pedestrian Level of Service Minimums

	Applicability	Minimum Bike Level of Service	Minimum Pedestrian Level of Service	BLOS Exceptions	PLOS Exceptions
Condition 1	New roads on new ROW, and in new developments throughout the County.	B	B	*C acceptable in certain situations.	*C acceptable in certain situations.
Condition 2	Improvements to Roads and Streets in Developed Areas: --Suburban Policy Areas; --Transition Policy Areas, --Joint Land Management Areas	C	B	*Major Arterials can be D in certain situations; provision of a shared use sidepath is recommended in these cases.	*Major Arterials can be C in certain situations.
Condition 2a	Roads and Streets within 1.25 mile Radius of Elementary, Middle and High Schools within Condition 2 Policy Areas;	B	B	*Major Arterials can be C.	*Major Arterials can be C.
Condition 3	Improvements to Roads in Rural Policy Areas that have been selected for the Countywide Network.	C	NA	Highest BLOS that can be achieved or provision of an off-road pathway.	NA
Condition 3a	Designated Bike Route System within the Rural Policy Areas	B	NA	BLOS C and traffic calming, or route cannot be designated.	NA
Condition 3b	Rural Villages: Aldie, Bluemont, Lincoln, Lucketts, Paeonian Springs, Philomont, St. Louis, Taylorstown, Waterford.	C	C	The highest BLOS feasible using traffic calming.	The highest PLOS feasible using traffic calming.
Condition 3c (When applicable, this minimum prevails over 3, 3a or 3b.)	All roads and streets within a .75 mile radius of all schools within Western Loudoun Rural Policy Area..	B or 5 foot paved shoulder	B or 5 foot sidewalk or paved shoulder	Accommodations sufficient to create a "safe walking route" to school, as determined by the LCPS Transportation Dept.	No Accommodations sufficient to create a "safe walking route" to school, as determined by the LCPS Transportation Dept



Refer to Appendix E for a more detailed explanation of the County's Level of Service policy, including a description of exceptions that are acceptable to the minimums shown above.

Accessibility of the Network

For the purposes of this Plan, the term pedestrian includes any person with a disability that may limit his or her mobility, sensory or cognitive capabilities. Pedestrians include all people who walk, sit, stand or use a wheelchair or motorized scooter in public spaces. It is estimated that 85 percent of all Americans who live to their full life expectancy will eventually experience a permanent disability.[26] For people with disabilities, smooth surfaces, lack of pathway barriers and clear transition areas are important. Accessible design is the foundation of all pedestrian design.

Accessibility Policy

1. The County shall use, and ensure compliance with, accepted national standards including the Americans with Disabilities Act Accessibility Guidelines and "Draft Guidelines for Public Rights-of-Way (June 2002)."

Provision of Walkways & Sidewalks

All streets and roads in Loudoun County (other than limited access highways where pedestrians are prohibited) should be planned and designed with pedestrian use in mind. In the Rural Policy Area, outside of tows and villages, providing sidewalks for pedestrians is typically not desirable or cost effective, though traffic calming techniques can improve pedestrian conditions along rural roads. In western Loudoun County, rural roads within town and village settlements, and areas near schools shall receive a higher level of attention for pedestrian safety. The following policies are provided to guide the provision of sidewalks:

Walkway and Sidewalk Policies

1. CTP roads in or near villages or schools in the rural policy area should have sidewalks with a minimum width of 5 feet. Where buildings, valuable trees, historic characteristics or other factors present physical constraints, sidewalks may be narrowed, limited to one side, or striped, paved shoulders of 3-5 feet may be used to create space for pedestrian travel. Vegetative buffers of 2 feet or greater between roadway and sidewalk, should be used when space allows. Traffic calming measures will be used to discourage speeding and/or allow motor vehicles to be accommodated safely with narrow lane widths.

2. In the Suburban and Transition Policy Areas, the Joint Land Management Areas, and in new villages, the following minimums will apply:

    a. Residential streets should have sidewalks with a minimum width of 5 feet. Vegetated buffers of no less than 2 feet shall be provided. Sidewalks shall be provided

on both sides of the street, unless there is an insurmountable physical constraint. Physical design measures will be used to discourage speeding.

b. Collector and arterial roadways should have sidewalks on both sides, with a minimum width of 6 feet, unless ROW is limited due to the close proximity of buildings, or environmental or cultural resources. Vegetated buffers of no less than 4 feet shall be provided. Roadways that have buffered and continuous sidepaths, of a width of 6 feet or greater, shall be considered to have met the minimum sidewalk requirements. Physical design measures will be used to discourage speeding.

Bicycle Amenities

Adequate provision of bicycle parking is essential for increasing use of bicycles for transportation. In addition, amenities such showers, lockers and changing facilities are as important to the bicycle and pedestrian network as parking is to office buildings. The following bicycle parking policies are recommended:

Bicycle Amenities Policies

1. The County shall develop bicycle parking policy and bike commuter facility standards for use throughout the county to ensure that adequate and appropriate bicycle parking is located at places of employment, within shopping centers and districts, at transit centers and park and ride lots, parks, at public buildings and at other appropriate public facilities.

a. The County shall recommend bicycle locker and rack equipment types, and address equipment siting, protection from the elements, maintenance, replacement and security.

b. The Countu shall establish minimum quantities of bicycle parking capacity required in new developments, based on the type of location served and the applicable requirements to provide vehicle parking spaces; provision of bicycle parking shall lower requirements for vehicle parking, accordingly. It shall also address expansion of capacity over time to ensure that all demand is met.

c. At places of employment of a certain age, size and type, the County shall establish requirements to provide showers, clothing lockers and changing rooms.

d. These policies and standards shall be compiled in a manual and provide procurement guidelines and resources.

The "inverted U" rack is recommended by the Association of Pedestrian and Bicycle Professionals

2. The County shall develop a single bicycle rack and locker procurement, distribution and installation program to expedite and simplify the process of providing bicycle parking to serve destination locations throughout the County. This program should be designed to simplify procurement by consolidating it for various county agencies, the Towns, and other public entities, and realize cost savings by applying a countywide economy of scale. It should also be designed to extend its benefits to serve small businesses and small non-profit organizations.

Bikeway and Walkway Facility Types

Following is an overview of the basic facility types that are recommended within this plan. Design details for many of these facilities and treatments are provided in the Design Toolkit.

Recommended Bikeway Types – On-Road

Shared Roadways

- *Shared Roadways* are those streets and roads where bicyclists may be adequately served by sharing the travel lanes with motor vehicles. Usually, these will be streets with very low traffic volumes and/or low speeds, which do not need special bicycle accommodations.

Striped/Paved Shoulders

- There is no minimum width for paved shoulders, however a width of at least 4 feet is required to be formally designated as a bike lane. Generally, at least two feet of paved roadway surface outside the lane edge stripe are needed to support bicycle travel. On urban roads, where there is not enough space for a designated bike lane, striping the vehicle travel lanes to provide two or more feet of paved shoulder improves comfort and safety for bicyclists. On rural roads, any amount of paved shoulder improves safety conditions for bicyclists.

Bike Lanes

- A bike lane is a portion of the roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes are always located on both sides of the road (except one way streets), and carry bicyclists in

the same direction as adjacent motor vehicle traffic. The minimum width for a bicycle lane is 4 feet; five- and six-foot bike lanes are typical for collector and arterial roads.

Recommended Walkway Types

Sidewalks

- Sidewalks are the central ingredient of the countywide pedestrian network. Provision of sidewalks along streets and roads should be routine in Towns, villages and in the Suburban, Transition and JLMA policy areas. They should be included on both sides of the street and be a minimum of five – six feet wide. In most locations sidewalks should be separated from the roadway with a vegetated buffer.

Intersection Treatments

- Street intersections are perhaps the greatest barrier that pedestrians face in Loudoun County. A lack of pedestrian safety at intersections is a significant deterrent to walking. Appropriate treatments include a wide variety of features, including high visibility crosswalks, wheelchair ramps, curb extensions, median refuges, countdown signals, in-median safety bollards, mid-block crossings, and more. The Design Toolkit provides more detail about the application and design of many of these treatments.

Recommended Shared Use Facilities

Shared Use Pathways

- Shared use pathways or trails are an important component of a bicycle and pedestrian transportation system, because they can provide a high quality walking and bicycling experience in an environment that is protected from traffic. Generally, shared-use paths should be a minimum of ten feet wide and paved.

Hybrid Shared Roadway

- A *hybrid,* shared roadway is a unique treatment that is more commonly used in Europe. It may be appropriate for rural roads in Loudoun County where existing road way cross sections are narrow, road widening to provide increased paved shoulder width is not feasible, traffic speeds need to be controlled, and bicycle and pedestrian safety improvements are warranted. This treatment provides combined bicycle/pedestrian ways on the outside edges of the roadway with striping and a distinctive pavement coloring and requires motorists to share this space with non-motorized road users.

Overpasses, Bridges, Tunnels and Bicycle/Pedestrian Ferries

- These are shared use facilities that provide access across barriers such as rivers, streams, railroads, freeways interchange ramps and arterial roads. These facilities are used in conjunction with any of the other types of bikeway and walkway facilities. They provide important linkages where safe and direct bicycle and pedestrian access can be better provided with facilities that are separate from the existing roadway system.

Recommended Traffic Calming Treatments

- Transportation professionals define traffic calming as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." Traffic calming treatments, or measures, are intended to modify driver behavior, reduce vehicle speeds and increase safety and access for all street users.

- Some of the engineering techniques and treatments for implementing traffic calming measures include the following:
- Vertical changes in the street--speed bumps, speed tables, raised intersections, raised crosswalks;
- Lateral changes in the street--offset intersections, lateral shifts;
- Constrictions in the street--narrowed travel lanes, narrowed pavement widths, pinch points, islands, traffic circles or roundabouts, entrance features, small corner radii;
- Related streetscaping--surface textures, edge treatments, colors, landscaping, street trees and street furniture.

B. Land Development

Loudoun County has made great strides in recent years in improving accommodation for pedestrians and bicyclists during the land development process. Continued inclusion of bicycle and pedestrian design into the land development process is critical. Important bicycle and pedestrian issues include access to and through developments, connections to adjacent developments, and circulation within development sites and residential neighborhoods. Other important features should include provision of bicycle parking, amenities such as showers and lockers for bicycle and pedestrian commuters, sheltered transit stops in commercial developments, and wayfinding systems in residential and mixed use communities.

Land Development Policies

The following policies provide a framework for how land development should address the needs of bicyclists and pedestrians. Land development projects often include new or improved roadways, and all policies guiding roadway development apply to land development as well, when transportation improvements are a project element.

1. Zoning and/or subdivision development policies and codes shall be modified to ensure pedestrian and bicycle access.

2. Residential, commercial, mixed-use developments and future transit stops shall apply level of service standards to provide adequate internal bicycle and pedestrian circulation systems in the form of on-street bicycle accommodations and sidewalks (per the LOS minimums),

3. Residential, commercial and mixed use developments are encouraged to provide off-street bicycle and pedestrian circulation and pathway systems that augment the on-street system in order to provide the highest quality linkages to the primary destinations and *reduce travel distances* for pedestrians and bicyclists;

4. Residential, commercial and mixed-use developments shall provide necessary improvements to the roadways in the adopted Network within the determined area of impact (per the LOS minimums);

5. Residential, commercial and mixed-use developments shall provide bicycle, pedestrian and transit access linkages to the adopted Network outside of the development, but within 0.50 miles of it;

6. Residential, commercial and mixed-use developments shall provide bicycle and pedestrian access through the development in various directions, so as to prevent it from becoming a barrier between other trip origins and destinations in the community;

7. Residential, commercial and mixed-use developments shall provide sufficient number of bicycle and pedestrian access points to ensure efficient connections to and from the various activity nodes within the development and linkages to existing or future adjacent developments.

8. Residential, commercial and mixed-use developments shall provide appropriate forms of bicycle parking, located in the appropriate places throughout the development, and showers and changing facilities in places of employment (per bicycle parking policy to be developed, see previous section);

    a. Residential, commercial and mixed-use developments shall provide appropriate wayfinding systems and other amenities to ensure the safety, comfort and security of bicycle and pedestrian travelers;

    b. Residential, commercial and mixed-use developments shall meet or exceed minimum national, state and county bikeway and walkway design standards for all of the accommodations outlined above (even optional facilities provided according to (2) above.

C. Transit and Demand Management

Loudoun County provides established bus transit services within the County, and ridesharing facilities and programs have been growing as residential and employment based development expands in Eastern Loudoun. Currently, services include six fixed bus routes in greater Leesburg, the 7 to 7 on 7 between Leesburg and Town Center Plaza on Dranesville Road, and two commuter bus services (Cascades Town Center to W. Falls Church Metrorail Station and service from Purcellville, Hamilton, Leesburg and Dulles N. Transit Center to Washington, DC). Eleven Park-and-Ride lots serve carpools, vanpools and the commuter bus routes; only one has bicycle parking (Dulles North). There is a telework center located in Sterling.

Even though Loudoun County's transit services are small today, maintaining and developing high quality pedestrian and bicycle access is important for today's success and the future. As a suburban jurisdiction with lower densities, integrating bicycle and transit services will widen the service or "catchment" area of a bus line or transit center and thus increase transit ridership.

The W&OD Trail running the length of the County presents new and creative opportunities. There may be potential to develop "drive-park-and-ride" trips, where commuters drive their car (with their bike on the back) to a W&OD trailhead, and bicycle to an employment site near the trail in the Dulles area, Fairfax County, Arlington or Alexandria. Some pedestrians would also benefit. Given today's lifestyles and traffic congestion on the roads, there may be a significant market of people who are interested in combining regular exercise with commuting, but don't have the luxury of living adjacent to the trail.

The most significant opportunity Loudoun County has to maximize the effectiveness of transit is to ensure high quality bicycle and pedestrian access to the future transit stations that will come with the Dulles Metrorail extension project.

Transit and Demand Management Policies

1. All future transit planning efforts undertaken by the County, the Washington Metropolitan Area Transit Authority (WMATA), the Northern Virginia Transportation Commission (NVTC), VDOT or others shall thoroughly address bicycle and pedestrian access to and integration with transit, including the following:
   a. provision of concrete pads and shelters at transit stops and stations,
   b. curb ramps and other sidewalk improvements around bus stops to ensure accessibility,
   c. secure and sheltered long-term bike parking at park and ride lots, and
   d. bicycle access on buses using front-mounted racks.

2. The County will explore with the NVRPA the potential for encouraging bicycle commuting by facilitating "drive-park-and-ride" use of the W&OD trail.

3. The County will ensure high quality bicycle and pedestrian access to, and urban design around, the future transit stations that will serve the Dulles Metrorail extension project in Loudoun County.

4. The County will continue to plan, fund and implement installation of on-bus bike racks to enable existing and future bus transit services operating in the County to transport bicycles. The County will encourage long haul commuter bus services to continue providing bike transport opportunities by using luggage compartments.

D. School Access

Local and national estimates suggest that up to thirty percent of morning peak hour vehicle trips are school bound trips or include dropping students at schools.[27] The environmental, social, health, traffic safety and direct costs of a system that delivers most students to school via school buses and personal automobiles are significant. While increasing the numbers of students that bicycle and walk to school can help mitigate the negative impacts of the current system, safe routes to school must be created before parents and school officials will feel comfortable encouraging students to use them.

Creating safe routes to school requires action on a number of fronts. For access to be effective, both the school grounds and nearby roads and developments need to provide safe accommodations. New schools and new developments adjacent to schools need to be designed and built using the bicycle- and pedestrian-friendly policies and techniques advocated by this plan. Existing schools and neighborhoods must be retrofitted. In addition to the physical improvements, education of students, especially those of elementary school age, is needed to ensure adequate skill levels and encourage safe walking and biking behavior. Moreover, enforcement and guidance is needed in the form of crossing guards and policing of motorists and all travelers in school zones.

School Access Policies

The following policy framework lays a foundation for improving bicycle and pedestrian access to Loudoun County Public Schools.

1.The County will encourage the School Board and relevant towns to review and provide advisory consent for the Level of Service policy elements that relate to schools and the creation of safe bike and walk routes around new and existing schools.

2. The County will encourage the School Board to initiate a "Safe Routes to School" Pilot Program designed to increase the number of children and youth who safely bicycle or walk to school. This pilot program shall be based on existing models used in Maryland and elsewhere to plan physical improvements and implement safety education programs and enforcement initiatives at one or two schools, with an eye toward expanding its implementation over time.

Sterling Middle School

3. The County will encourage the School Board to establish a bicycle parking accommodation policy and procurement procedure that has been customized for the public school administration; it might use a similar but more flexible approach than that mentioned in the Bicycle Parking Policy section above.

E. Park Access

Loudoun County is served by sixteen large, regional parks, including nine that are managed by the County Park and Recreation Department, six that are managed by the Northern Virginia Regional Park Authority (NVRPA), and one that is managed by the Town of Leesburg. The road and shared use path improvements that are identified on the Network Map include those that need to be made to improve access to the regional parks, as well as smaller neighborhood parks.

Some of the larger parks offer opportunities to improve overall bicycle and pedestrian connectivity because key components of longer inter-community routes and short neighborhood linkages can be located within them. For example, improvements to the "short cut" trails across Claude Moore Park could improve connections between Sterling and the Dulles Town Center and Route 28 corridor. Connections through Ashburn Park could be part of improved linkages between the various Ashburn neighborhoods and the W&OD Trail. Any changes must be consistent with the mission and physical setting of each park.

Bicycle parking accommodations are also important facilities that should be provided in parks.

Park Access Policies

1. The County will identify and implement small-scale access improvements including directional signage, installation of bicycle parking and trail paving in Loudoun County parks, consistent with historic, environmental and other site constraints.

2. The County will identify small-scale access improvements including directional signage, installation of bicycle parking and trail paving that are needed in NVRPA, Town of Leesburg, private, state or federal parks and coordinate implementation with the appropriate managing agencies.

3. The County will inventory bicycle parking accommodations at Loudoun County and NVRPA parks and ensure that a bicycle parking policy and procurement procedure for parks is included in the Countywide policy and program identified in the previous section on this topic.

F. Network Maintenance and Management

Because the County owns and manages very little of the roadway system, ensuring good maintenance will require coordination with a variety of other parties. This includes VDOT, NVRPA, developers and property managers, HOAs and others. VDOT will maintain approved bicycle and pedestrian facilities located within the right-of-way of roadways that are under its operational control, except for snow and ice removal (as per VDOT policy of Dec. 19, 2002). Until the County is able to expand its public works development and maintenance capacity, other facilities will have to be maintained by their respective owners.[28]

A first step in developing a maintenance program is to identify what tasks need to be undertaken and who is responsible for these tasks. Responsibility is largely determined by facility ownership. Tasks are largely divided between on-street bikeway maintenance tasks, "off-street" sidewalk and sidepath tasks, and multi-use trail maintenance tasks. Recommended maintenance practices include:

- Sweeping bicycle lanes and shoulders regularly to remove debris;
- Repairing roadway surfaces and sidewalks to ensure a continuous facility and smooth surface that is free of cracks, potholes, bumps and other physical problems;
- Careful repair of utility cuts to prevent rough surfaces for cyclists and sidewalk interruptions for pedestrians;
- Cutting back vegetation including intrusive tree roots to prevent encroachment;
- Maintenance of bicycle and pedestrian signs, striping, and markings, especially replacement of signs that are damaged by vehicle crashes and other incidents;
- Maintenance of drainage facilities including catch basins and drainage grates;
- Snow removal; and
- Signal maintenance.

The NVRPA has a model maintenance and management program for the W&OD Trail, as well as a long history of working with trail support groups to augment the agency's maintenance resources with those of volunteers. Practices and procedures from this model should be studied and applied to existing paths in the County, and any new pathway facilities that are added to the network by VDOT or developers.

Additional practice recommendations for network maintenance are provided in Appendix F.

Network Management and Maintenance Policy

1. The primary action recommended for maintenance and management is that the County identify a lead agency and establish a system to address both regular and remedial inspection and maintenance of the on-road and off-road bicycle and pedestrian network. Once a system is established, a "Maintenance Action Request Form" could give citizens an easy means of reporting maintenance concerns.

Chapter 5: Recommended Bicycle and Pedestrian Network

A. Network Overview

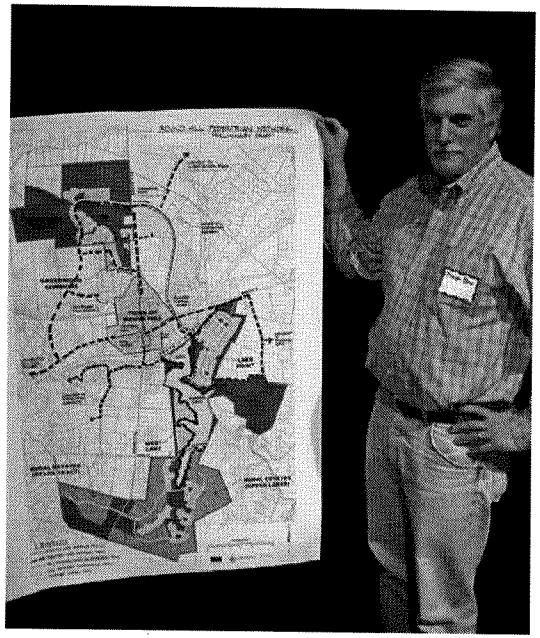
Identifying a network of existing and proposed bikeways and walkways is a central element of this Plan. It is the first step toward achieving the goal of countywide bicycle and pedestrian connectivity among residential neighborhoods, towns, villages, workplaces, shopping centers, transit stations, schools, parks and other important destinations. Development of a network is also important for achieving the goals of meeting the needs of a diverse set of users, ensuring their safety and increasing the numbers of people who will use bicycling and walking for a greater portion of their daily transportation.

The Bicycle and Pedestrian Network Map (see map pocket) shows the primary routes and locations that should be improved to provide a connected bicycle and pedestrian network. Elements shown on this map include the following:

- High Priority roads and streets proposed for bicycle and pedestrian accommodations
- Proposed neighborhood linkages
  - Short path connectors
  - Bridges
  - Bicycle & pedestrian ferries
- Proposed off-road, shared use path corridors
- Pedestrian improvement areas
- Key linkages to neighboring jurisdictions

The purpose of the Network Map is to establish a vision of what can be created through sustained effort. It provides a geographically comprehensive framework that addresses the County's primary bicycle and pedestrian connectivity needs. It should be noted that the map is not intended to suggest that bicycle and pedestrian improvements are not necessary in locations that are not designated on the map, nor is it intended to designate specific facility types for particular roads.

B. Analysis Process



To select the roads, corridors and features in the proposed Network, a planning team used a variety of exercises and considered many inputs. First, ideas for bicycle and pedestrian improvements and desired locations for access were gathered from CAC members at working sessions of the committee and the general public at four evening meetings and via the project website. Additionally, field visits were conducted by the CAC, agency staff and consultant team. Input was also received from members of the

Interdepartmental Advisory Team (IDAT), which is composed of County agency staff.

Roadway and intersection designations in the Countywide Transportation Plan (CTP) were studied and mapped, and CTP roadway design policy and functional classifications were also reviewed. This was augmented by a thorough study of road and street connectivity, identification of planned future roads, a review of existing and planned population density, and identification of key destinations such as parks, schools, employment centers, shopping centers, etc.

In addition to review and mapping of the County's Policy Areas—Suburban, Transition, Rural and Joint Land Management, a number of planning documents were reviewed, including:

- Town bicycle, pedestrian and vehicular circulation plans and trail and greenway plans;
- County, VDOT, Route 28 Improvement District and other roadway improvement plans and programs; and
- studies identifying existing and proposed transit routes.

Finally, the bicycle and pedestrian Level of Service results described in Chapter 4, and the bicycle and pedestrian Latent Demand Analysis conducted as a part of the Northern Virginia Regional Bikeways and Trails Study, were factored into the analysis.

Pedestrian Improvement Areas

Pedestrian Improvement Areas (identified on the Network m ap) represented on the map with black circles, include both *high use areas* and *problem areas*--some improvement areas are both (for more details about the inputs used to select improvement area locations see Appendix G).

- *High Use* areas are locations where significant levels of pedestrian traffic are already present or where higher levels of use are desired or likely due to latent demand analysis or future land uses and projected development.

- *Problem Areas* are locations where pedestrian accidents are occurring, where street crossings are difficult or dangerous, where connectivity is desired but blocked by large roads, lack of facilities or other barriers, or where poor pedestrian conditions or personal security concerns are a deterrent to pedestrian use.

C. Network Development Priorities

The connectivity goal identified in this Plan calls for increased bicycle and pedestrian access among a diverse set of activity nodes. Improved access to the W&OD Trail, the C&O Canal Towpath in Maryland, the Appalachian Trail and the scenic Western Loudoun countryside are important connectivity objectives. Non-motorized access to the future Potomac Heritage National Scenic Trail and other planned trails is a strong concern of the Citizen Advisory Committee.

As described in Chapter 3, the primary barriers to increased connectivity are poor levels of service on existing roads and bridges, gaps in the existing bicycle and pedestrian network, large intersections that are intimidating to bicyclists and pedestrians, multi-lane roads that are difficult to navigate along and cross, and large features such as Dulles International Airport and the Potomac River. The following set of recommendations address these issues and provide a detailed guide for future actions that will improve bicycle and pedestrian connectivity in future years. Projects and proposed facilities within the boundaries of incorporated Towns are the jurisdiction of those Towns.

The Network recommendations have been organized into seven groups:

1. **Baseline Connecting Roadways**
2. **Major Road and Connecting Corridors**
3. **Off-Road Path Corridors**
4. **Neighborhood Connectors**
5. **Rural Bicycle Touring Routes**
6. **Pedestrian Improvement Areas**
7. **Connections to Neighboring Jurisdictions**

1 Baseline Connecting Roadways

A baseline network of connecting roadways is identified on the map in orange. This set of roads includes most existing and future CTP roads, as well as additional routes that were selected to provide comprehensive connectivity throughout the County and its most populated areas. For the most part, these roads will need to serve both bicyclists and pedestrians, however on some segments of the rural roads in Western Loudoun, the need and opportunity to serve pedestrians with dedicated facilities does not exit. The composition of this baseline network fulfills the following criteria:

a. It connects all major and minor population centers.
b. It links each village and rural Town into the Network.
c. It includes most roads currently used for rural bicycle touring.
d. It links most public schools and associated recreation facilities into the Network.[29]
e. It links all major parks into the Network.
f. It provides access to all major employment centers and shopping areas.
g. It provides multiple linkages to transit stations and services.
h. It includes all primary connections to neighboring jurisdictions.
i. It includes both VDOT and Town controlled roads within Leesburg and Purcellville, but is not based a comprehensive bicycle and pedestrian planning analysis of either of these communities.
j. It includes most, but not necessarily all, roads that are likely to need improvements to bicycle and/or pedestrian accommodations over time.

Policy

1. Exercise every opportunity to improve bicycle and pedestrian conditions in the Baseline Network of Connecting Roadways by integrating appropriate accommodations into roadway improvement projects as they arise in the transportation or land development process.

2 Major Roads and Connecting Corridors

Drawing from the baseline network of connecting roadways and from the neighborhood connectors (explained in section C-4) a subset of major roads and connecting corridors was developed (see Table 5-1). This subset was developed to identify a smaller set of primary corridors that will serve the bicycling and walking needs of a large number of non-motorized travelers. They connect key destinations and serve major population centers, and activity nodes throughout the county. The primary criteria used to select these corridors included public input, roadway network analysis, latent demand analysis, and an assessment of origins and destinations.

Policy

1: The County will ensure that every opportunity is used to improve bicycle and pedestrian conditions along the Major Road and Connecting Corridors. Because of their complexity and large scope these routes will be developed on a segment-by segment basis.

Table 5-1: PRIMARY ROADS AND CONNECTING CORRIDORS

#	Corridor Name	Primary Roads/Facilities Used	Rationale & Areas Linked	Key Issues & Needs
1	Lowe's Island -- Cascades Town Center (CTC)	Neighborhood Streets such as Lowe's Island Blvd., Westwood, Sugarland Run Dr. and Cottage Rd., and New Connector Trails.	Link residential areas to shopping, employment and transit.	Improve tunnel at Great Falls Shopping Center. & provide bridge over Sugarland Run and connections through neighborhood streets.
2	Dulles Town Center -- Cascades T.C.	New Connector Trails & Bridge over Rte. 7	Link mixed-use areas and provide safer crossing of Rte 7.	Potential new bridge over Rte. 7 just west of Cascades Pkwy interchange.
3	N.V. Police Academy – Cascades T.C.	New Connector Trails, Winding Rd., Rte. 7 corridor.	Link multiple residential areas to shopping/employment/ transit.	Bridge over Broad Run, sidepath along Rte. 7.
4	Algonkian Regional Park – Sterling & Herndon	Cascades Pkwy., Middlefield or Broadmore Drs., Potomac View Rd. New Connector Trails, Amelia St., Church, Lincoln, & Crestview; spur on Church Rd. east and west of Sterling Blvd.	Link Algongian Reg. Park to Cascades Town Center and Sugarland Run neighborhood. Links Sterling neighborhoods to CTC; link Cascades neighborhoods to W&OD & Herndon destinations.	Potential for partial grade separated crossing of Rte. 7 near Potomac View. Potomac View Rd. presents an opportunity for quick hit bicycle lanes by paving a gravel shoulder and re-striping part of the roadway.
5	Route 7 East (See Corridors 2-4 above)	Route 7: Fairfax Co. Pkwy. to Route 28.	Improve access along 7 from Fairfax Co. Pkwy to Route 28.	Can be planned and implemented in discrete segments, sidepath layout and alignment will need to vary; may not be needed on both sides in all segments.
6	Riverside Pkwy. /Route 7	Route 7, Riverside Pkwy or both from River Creek Pkwy to Rte. 28/Broad Run; New Connector Trails and Bridge.	Link Leesburg with Cascades; the W&OD Trail is too far south. Links in Landsdowne, Loudoun Hospital Center and educational institutions N. of Rte.7	Determine if facilities are provided on Riverside Pkwy, will they also be needed on all of Rte. 7. Proposed new interchanges along Rte 7 will be a design challenge. Use same bridge over Broad Run as Corridor 3.
7	W&OD Trail – Algonkian Regional Park.	Church, Cascades Pkwy, New Connector Trails	Link major recreational destinations and activity areas between.	Use same new bridge over Rte 7 as Corridor 2; improve on-road conditions.
8	Algonkian Pkwy	Algonkian Pkwy, Holly Knoll Dr.	Link resources along Algonkian; residential areas, parks, schools, Fairfax Co. trail system, Dulles T.C.	Coordinate with Fairfax County, developers who made proffers and HOAs.

9	Lovettsville - Brunswick, MD	VA 287, Berlin Turnpike	Link Lovettsville w/ C&O Canal and N.B., MD MARC train station	ROW acquisition may be necessary; abandoned road may present opportunity for sidepath.
10	Purcellville – Lovettsville	VA 287, Berlin Turnpike	Link Purcellville and W&OD Trail to Lovettsville & C&O Canal Towpath.	ROW acquisition may be necessary; selecting a bikeway facility type may require a study.
11	Round Hill – Hamilton	Business Route 7	Link Towns via their Main Streets: Round Hill, Purcellville & Hamilton. Improves access to Franklin Park, W&OD Trail and local schools.	Bikeway/walkway facility design will need to vary throughout this long and diverse corridor. Intersection design and multi-modal traffic flow are key.
12	W. Virginia - Round Hill	Route 7	Link W&OD Trail and Round Hill w/ Bluemont & Appalachian Trail	ROW acquisition may be necessary; selecting a bikeway facility type may require a study.
13	W&OD Trail - Lovettsville	Route 9, Clarke's Road, Milltown Road	Link W&OD Trail with Waterford, and Lovettsville.	The Route 662 ROW is narrow and corridor has constraints presented by historic/environmental characteristics. Good location to try an innovative treatment.
14	White's Ferry/ Ball's Bluff Access	King St. from Market St., US 15, White's Ferry Rd.; spur on US 15 bypass from Ft. Evans Rd. to the merge with 15, spur on Dry Hollow and Ball's Bluff Roads.	Link Leesburg with White's Ferry & C&O Canal. Provide access to Ida Lee and Balls Bluff parks.	Proper facility design on high speed, high volume arterial roadways. An opportunity exists to utilize Dry Hollow Rd. and Ball's Bluff Road to link into the BB Battlefield Reg. Park. Combines with old BB R. a riverside route to White's Ferry might be possible.
15	White's Ferry - Point of Rocks, MD	US 15	Link Leesburg T.C., Lucketts and Point of Rocks MARC station. Provide access to Temple Hall Farm Reg. Park.	Road widening may be necessary. Managing traffic speed, intersection design, safety and potential historic and natural resource impacts are key.
16	King Street South	King St. from Market St. to Harmony Church Rd; spur on Evergreen Mill from King St. to Heritage H.S. spur on Masons Lane & Battlefield Pkwy.	Link Leesburg Town Center, W&OD Trail S. Leesburg neighborhoods and three new schools and a park.	Facility design through Interchange at Rte. 7 Bypass.
17	Market St. / Fort Evans Road	Market St (& Loudoun) from western Town Line to Fort Evans Road to River Parkway	Link Leesburg Town Center with Fort Evans Plaza shopping area and Corridor 6 at Founders' Field.	See NOVA Bikeway Study Case Study for issues along Market St.; reconnecting Ft. Evans Rd. at Rte 7 Bypass intersection, and crossing intersection, is key for bike & pedestrian linkage.
18	Edwards Ferry / River Creek / Crosstrail.	Edwards Ferry Rd. from Market to Shoal Creek, River Creek to Rte. 7, Crosstrail to Evergreen Mill Rd.	Link Leesburg T.C.with Red Rock Reg. Pk & River Creek community. Links River Creek to W&OD Trail and new development in S. Leesburg	Intersection crossing improvements at Rte. 7 bypass. On-road and off-road facilities will be needed on River Creek and Crosstrail.

19	Sycolin/Plaza	Plaza St. in Leesburg and Sycolin Rd. to Belmont R. Rd.	Links northern Leesburg, W&OD Trail, new neighborhoods in southern Leesburg, Leesburg airport, and mid-Ashburn.	Improved access is needed at W&OD Trail crossing in Leesburg; plans to develop interchange at Sycolin Rd. and Rte. 7 Bypass will present design issues.
20	Farmwell / Waxpool East	Ashburn Farm Pkwy from Belmont R. Rd. to Farmwell Rd. to Waxpool Rd. to W&OD Trail	Link middle Ashburn with Dulles employment area, W&OD Trail and Sterling/Cascades	Integrating bicycle/pedestrian improvements into various road improvement projects; design of accommodations through new interchange at Route 28.
21	Waxpool West	Waxpool Rd. from Belmont Ridge to WorldCom Campus; spur on Broadlands Blvd./ Shellhorn Rd./Faulkner Pkwy. to Waxpool.	Link southern Ashburn with Dulles employment area, W&OD Trail and Sterling/Cascades. Provide linkages to local schools in Ashburn.	Integrating bicycle/pedestrian improvements into various road improvement projects; improving local linkages within the various campuses of the Dulles Employment Area.
22	Gloucester Pkwy./ Hay Rd.	Uses Gloucester Pkwy from Belmont R. Rd. to Nokes Blvd. to Dulles TC and Cascades Parkway; spur on Hay Rd. to W&OD Trail to Farmwell MS; and spur on City Center Blvd. to Rte. 7	Link northern Ashburn with Dulles employment area, Dulles Town Center and Sterling/Cascades. Provide linkages to local schools in Ashburn.	Integrating bicycle/pedestrian improvements into various road improvement projects; design of accommodations through new interchange at Route 28.
23	Loudoun Co. Pkwy.	Presidential Dr. from GWU-VA Campus & Loudoun County Parkway to S. Riding and Manassas Battlefield in Prince William Co.	Link Potomac Heritage Natl. Scenic Trail (PHNST) & Rte. 7 with Dulles Employment Area, S. Riding and P.W. County.	Facility design; and ensuring utility of bicycle and pedestrian features as the Parkway is implemented in phases that will be spread over a significant time period.
24	Ashburn Road	Landsdowne Blvd., Ashburn Rd. Shellhorn Rd., Ryan Rd. and short off-road trail connector.	Link Landsdowne, Ashburn Village, W&OD Trail and future Moorefield Metrorail station. Provide linkages to local schools in Ashburn.	Integrating bicycle and pedestrian facilities into this often-narrow ROW and through Ashburn Village. Completing the linkage to the future rail station near Ryan Rd./267 interchange.
25	Ashburn Village Blvd. / Ryan Rd.	Janelia Farm Blvd., Ashburn Village Blvd. Ryan Square Rd., Ryan Rd. (or East-West Connector), to Evergreen Mill Rd.	Link Rte. 7, central Ashburn, future Moorefield Metrorail station, Belmont Green, and Brambleton Reg. Park. Provide linkages to local schools in Ashburn and western parts of the Dulles Employment Area.	Retrofit of recently built Ashburn Village Blvd. and Ryan Sq. Rd.
26	Belmont Ridge Rd.	Upper Belmont Pl., Xerox Dr., Belmont Ridge Rd. and Gum Spring Rd.	Links PHNST, Xerox/Landsdowne with W&OD Trail, eastern Ashburn, Brambleton Reg. Park, S. Riding and P.W. County.	Facility design; and ensuring utility of bicycle and pedestrian features as road widening is implemented in phases that will be spread over a significant time period.

27	Old Ox Road	LC Pkwy & Old Ox Rd. from US 50 to Herndon; spurs on Moran Rd. and Cedar Green Rd.	Links S. Riding w/ Dulles Employment Center, future 606 Metrorail station, Dulles Airport, W&OD Trail, Cascades & Sterling. Will be a major component of a circumferential route around Dulles airport.	Facility design; and ensuring utility of bicycle and pedestrian features as road widening is implemented in phases that will be spread over a significant time period.
28	Atlantic/Shaw	Existing and future Atlantic Blvd., Shaw Rd., a short connector trail, Innovation Ave., and Rock Hill Rd.	Links Algonkian Pkwy, Rte. 7 and Dulles TC with W&OD Trail, Dulles Employment Area, a future Metrorail station and Herndon in Fairfax County	Alignment of future Atlantic Blvd.; connections with W&OD Trail; facility design in high speed, commercial corridor; ensuring utility of bicycle and pedestrian features as roadways are implemented in phases; ensuring good linkages in Fairfax County near Dulles Toll Road.
29	U.S. 50 East	US 50 from Fairfax County to US 15.	Links S. Riding to Western Loudoun and Fairfax County	Providing safe and attractive bicycle/pedestrian accommodations on this high speed, high volume highway; designing these facilities through multiple proposed interchanges.
30	U. S. 50 West	US 50 from US 15 to Fauquier County.	Links S. Riding and Middleburg and Fauquier County	Providing improved bicycle accommodations in conjunction with planned pedestrian-oriented traffic calming measures.
31	Claiborne Parkway	Landsdowne Blvd., Claiborne Parkway	Links Landsdowne with western Ashburn and new Ashburn developments south of 267. Links with Loudoun Co. Pkwy. on southern end.	Some sidepaths have already been built along Claiborne. This route is slated to become the major north / south corridor serving traffic that now uses Ashburn Road.
32	Leesburg to Middleburg	Gledsville Rd., Oatlands Mill Road (650), Rte 15, Lime Kiln Rd., 734, 748, Rte. 50, spur on The Woods Rd. (771).	Links Leesburg with Middleburg while using only small portions of Rte. 15 and 50.	Lime Kiln Road is now a paved road. With the spur, this route will provide access to Future Banshee-Reeks Park and provide a connection between Leesburg and Middleburg that largely avoids the high speeds, volumes, and trucks on Rtes 15 and 50.

3 Off-Road Path Corridors

Over the course of this study, seven potential trail corridors were identified through public input and analysis of future land development patterns; in addition to being summarized below (Table 5-2), each are represented on the Network Map.

Five of the seven are directly related to the plans for extending the Metrorail system to Loudoun County along the Dulles Access Road and Greenway. The rationale for development of these trails is directly tied to a strategy of maximizing bicycle/pedestrian access to the Dulles rail extension transit stations, improving bicycle and pedestrian access to the thousands of job sites at and around Dulles International Airport, and realizing cost savings by building trail and transit infrastructure at the same time. Current County land use and transit policy stresses mixed-uses and pedestrian-friendly urban design at the future 772 Metrorail Station, however development of off-road paths and other bicycle and pedestrian facilities radiating from the Route 606 station is also important, to ensure high quality non-motorized access to and from the many employment sites that will be developed around this station. Following is a brief description of each corridor and the linkage it would provide.

Policies

1: Initiate feasibility studies for Off-Road Path Corridors 1-6.

2. Ensuring environmental protection of all sensitive areas is a goal of the study of corridors.

2: The County will request that the Dulles Rail Extension Trail (Path Corridor 7) be included in the planning, design and funding activities currently underway for the rail extension project.

Table 5-2: OFF-ROAD PATH CORRIDORS

#	Trail Corridor	Linkage	Purpose	Opportunity
1	Lovettsville / Rte. 287	Town of Lovettsville to Brunswick Bridge	Provide high quality facility in this high use corridor serving recreational trips, river access and commuters to the MARC rail station in Brunswick	An abandoned road may present an opportunity to develop a shared use path in this corridor.
2	Bluemont Connector	Round Hill to Bluemont	Further extend the W&OD Trail, link Round Hill and Purcellville with the Appalachian Trail near Bluemont.	Other than Route 7, assembling easements appears to be the only opportunity to create a public corridor.
3	Moorefield Station – Greenway West	Rte 772 Metrorail Station to Belmont Ridge Rd.	Link Brambleton Regional Park, schools and new residential development to transit.	Receive proffers from developers; use new road corridors and stream corridor.
4	Moorefield Station – Greenway North (Beaver Dam Run)	Rte 772 Metrorail Station to W&OD Trail in Ashburn Village following Beaver Dam Run.	Link Ashburn residential communities to transit. Link W&OD Trail, Ashburn Park, Greg Crittenden Park and local schools. Provide off-road alternative to Ashburn Road.	Receive proffers from developers; use new road corridors and stream corridor. Primary issues will include evaluation of the County's stream protection policy: RSCOD.
5	Moorefield Station – Greenway Northeast	Rte 772 Metrorail Station to Route 7	Link new transit station to Ashburn neighborhoods, W&OD Trail, employment areas around WorldCom campus, and new development west of Broad Run.	Receive proffers from developers; use stream corridor.
6	Dulles International Airport Ring Route	Rte 606 Metrorail Station to US 50 to new Air & Space Museum to Sully Rd. Metrorail Station	Link South Riding with NE Loudoun County and western Fairfax Co.	Include route as a part of roadway upgrades to Rte. 606, Rte 28 and the Rte 50 N. Connector.
7	Dulles Rail Extension Trail	Sully Rd. Metrorail Station to Rte. 772 Metrorail Station.	Complete the loop around the airport, link the loop to the airport terminal, provide access to employment sites in Rte. 28/Dulles business center, link the airport loop to Ashburn and Herndon	Include in Loudoun County request to WMATA and the Northern Virginia Transportation Commission (NVTC)

4 Neighborhood Connectors

On the Network Map, neighborhood connectors are shown using two symbols -- purple lines and purple triangles. . These projects are usually relatively simple and often inexpensive. Many of these proposed connector facilities are components of the major corridors already discussed, others will be discussed as a part of a later section addressing W&OD trail crossings and access. Within Ashburn, Cascades and Sterling there are additional locations for small connector paths that would provide more efficient local connections. These include the following:

a. upgrading the pathway connection across Claude Moore Park, consistent with Park mission and physical setting;
b. connecting some of the isolated subdivisions of Countryside with pathways;
c. upgrading and extending path connectors around Ashburn Park, and better connecting central Ashburn neighborhoods with the W&OD Trail (see also Corridor 4 above);
d. providing pathways across the open space at Northern Virginia Community College Campus linking Cottage, Potomac View and Campus Drive to Cascades Town Center.
e. improving neighborhood connections to the Sugarland Crossing Shopping Center area on the south side of Route 7;
f. linking the W&OD Trail to Severn Way West across Broad Run with a bridge and path; and
g. linking Rte. 287 and Lovettsville Elementary School with the pool and community center on Broad Way with a path along the Town boundary.

Policy

1: The County will seek funding for planning, design and construction of at least one Neighborhood Connector project per year over the next ten years. Seven projects are listed here, others are identified on the Network Map

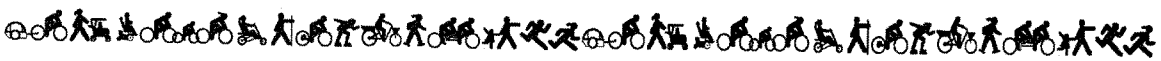
5 Rural Bicycle Touring Routes

Western Loudoun remains very popular as a recreational bicycle touring area. Its scenic farm country and historic towns and villages are popular destinations for bicyclists from around the region. Some long distance touring routes use Western Loudoun's roads as well. Both the W&OD Trail and C&O Canal Towpath connect the heart of the Washington region with rural Loudoun, bringing long distance cyclists, racers on training rides, club rides and even families. Moreover, many Loudoun County residents love to bicycle in the area.

Unfortunately, population growth in Loudoun and in West Virginia and Fredrick County, Maryland have increased traffic volumes and speeds on Loudoun's rural roads. The Bicycle Level of Service analysis performed for this plan found that most rural roads in Western Loudoun had levels of service "D" or lower.

However, an opportunity exists to initiate a network of designated bicycle touring routes in Western Loudoun. Designated routes can be signed, mapped, and promoted by local business and economic development entities. In addition to the economic benefits that can be realized by designating routes, it can also create an impetus for Towns, villages and private sector entities on the route to provide amenities that support recreational bicycling. These amenities might include rest stops, information kiosks and bike parking in towns, as well as new business development such as bed and breakfasts, bike shops, restaurants, and tour guide services.

Given current Bicycle Levels of Service, this Plan identifies two potential routes that could be designated with a small amount effort, including field study and sign installation:



a. Waterford to Tarara Vineyard & Winery (VA Rte. 662)
b. Purcellville to Middleburg to Round Hill (VA Rtes. 722, 728, 731, 734, 748, 50, 626, 719)

Bicyclists frequently use a number of additional routes. Other routes would likely need more significant LOS upgrades before they could be designated. These routes include Loyalty Road, Taylorstown Road, Lovettsville Road, Milltown Road, Rte. 287, and a variety of roads around Hillsboro, Round Hill Purcellville and Hamilton.

Policy

1: The County will conduct a field study of specified Rural Bicycle Touring routes, develop a designation plan and signage design, and implement designation.

6 Pedestrian Improvement Areas

Pedestrian improvement areas (PIAs) include both *high use areas* and *problem areas* – some pedestrian improvement areas are both. The Network Map identifies 66 improvement areas, representing a wide variety of situations. For the purposes of discussing PIAs in the Plan, they have been organized into the following classes (see table 5-3). For a complete list of PIAs see Appendix G.

Table 5-3: Pedestrian Improvement Area Classes & Types

Class	Improvement area Type	Number of Improvement Areas
1	Town Centers, Village Centers, Shopping/Employment Areas, School Areas, Future Rail Transit Centers	29
2	Intersections	7
3	Planned/Existing Interchanges	22
4	W&OD Trail/Road Intersections, Road Segments, Potomac River Bridges	8

Class 1 -- Activity Centers: Typical pedestrian issues in Class 1 improvement areas include ADA accessibility, crosswalks and intersection safety, wayfinding aids, gaps in the sidewalk network, a need for bus stop improvements or parking and personal security concerns. Bicycle parking in the form of racks or lockers is usually a need as well. Town Centers typically have the most complex and diverse set of needs. In communities like Leesburg and Middleburg, which are historic and based on traditional town plans with Main Streets, key needs are typically traffic calming, mid-block crossings, intersections improvements and ADA accessibility. The newer town centers, such as Cascades Town Center, have fewer ADA accessibility issues, but there is a need to address the large, high-speed roads and complex intersections, improve neighborhood linkages with connector paths, provide bike parking and add wayfinding signs. Needs in Village Centers and school areas tend to be smaller in scope and center around adding sidewalks or eliminating gaps in the sidewalk system, improving key crossing points, and utilizing gateway treatments as a part of traffic calming measures.

The Cascades Town Center Case Study included in this Plan (see Appendix H) provides an example of a more detailed town center study with ideas for improving intersections and walkability.

Activity Centers Policy

1: Provide planning leadership for pedestrian improvement areas in unincorporated areas. Each improvement area should receive a walking audit and field assessment of needs. Improvement projects shall be initiated as stand alone projects or based upon opportunities that arise such as new developments, road improvements, or construction of public facilities.

Class 2 – Intersections: Seven intersection improvement areas are identified on the Network Map, highlighting pedestrian crossing problems at a total of nine specific intersections (see table 5-4). Each of these intersections was identified as a problem during the public outreach and comment process.

Other problem intersections are identified in the plan as a part of Class 1 improvement areas. Those include intersections along Algonkian Parkway; Main Street in Purcellville; throughout Ashburn; within South Riding along US 50 and the Loudoun County Parkway; in Hillsboro; at Lucketts and White's Ferry Road on US 15; and along various roads that serve the Dulles/Route 28 employment area.

Public comment in this planning process clearly identified great difficulty for pedestrians and cyclists to cross Loudoun County's major roads including Route 7, Business 7, Route 50, Route 15, Route 9 and the Bypasses around Leesburg. Despite the difficulty, there remains a high public desire to make these crossings.

Table 5-4: Key Problem and High Use Intersections

1 Route 9 & Clarke's Gap Road
2 Route 15 Bypass & Edwards Ferry Road
3 Route 15 Bypass & Fort Evans Road
4 Route 7 & Campus Drive (NOVA Com. College.)
5 Route 7 & Potomac View Road
6 Route 7 & Palisades Parkway
7 Route 7 & Countryside Blvd.
8 Palisades Parkway & Southbank Street
9 Palisades Parkway & Potomac View Road

Implementing intersection improvements designed to increase both perceived and actual safety should be a central element of Loudoun County's future bicycle and pedestrian program. The application of specific treatments and designs must be evaluated on a case-by-case basis. New minimum intersection design standards are described in the Design Toolkit. Additionally, the following types of improvements should be considered for intersections identified in this Plan:

- high visibility crosswalks and textured pavement treatments
- smaller curb radii and curb extensions
- tactile warning devices and audible pedestrian signals
- pedestrian countdown signals and advanced green lights
- in-median pedestrian safety bollards
- median refuge islands and median noses
- right turn on red prohibitions
- appropriate landscaping

All four Case Studies included in this Plan provide more detailed examples of what is possible with regard to intersection improvements and retrofits.

Intersections Policies

1. Initiate planning and design of at least one major intersection improvement project per year.

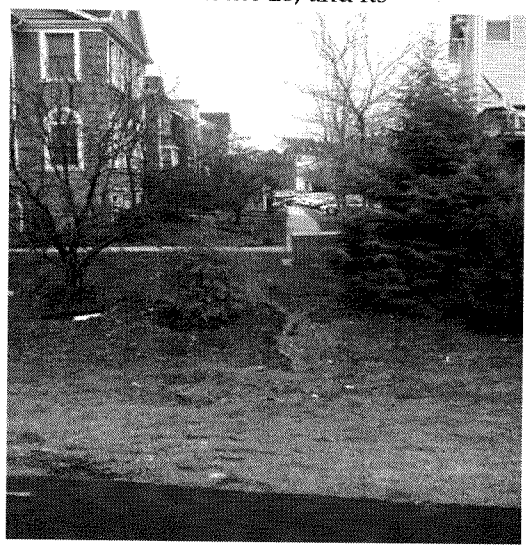
2. Ensure that all VDOT and Town initiated improvement projects for intersections that are in PIAs make pedestrian and bicycle safety and access as central objectives of the projects.

Class 3 – Interchanges: The Loudoun County CTP identifies 28 locations for major highway interchanges. Interchanges are roadway crossings where some or all of the turning movements are removed from signalized control and facilitated by continuous flow ramps and merge lanes. Future interchange locations are located primarily on VA Routes 7 and 28, and US Route 50, also along the Route 7 and 15 Bypasses around Leesburg.

Typical highway interchanges create significant bicycle and pedestrian bariers and safety hazards. Historically, interchange design has not accommodated bicyclists or pedestrians, such as the Route 7 / US 15 Bypass interchange on the east side of Leesburg. This interchange has effectively severed bicycle and pedestrian access between the Town of Leesburg and the shopping centers between Route 7 and Ft. Evans Road. Yet close proximity, and the lack of access to a car, has resulted in shoppers and workers continuing to cross high-speed roads and ramps on foot and bicycle because it is their most direct or only alternative.

Future Route 7, 50 and Bypass Interchanges: With increased development projected along Routes 7, 50 and the Leesburg Bypasses, it is critical that future interchanges on these roads include bicycle and pedestrian crossing accommodations. Moreover, new designs for these interchanges should be explored which are easier and less costly to make safe for non-motorized travelers. It may be the case that the need for an interchange should be reconsidered in light of the need for the roads using it to carry significant amounts of bicycle and pedestrian traffic. The funds saved from not constructing two or three planned interchanges could be used to provide bicycle and pedestrian accommodations through other interchanges or used to design highly efficient and safe at-grade intersections.

Route 28 Interchanges: A number of interchanges along Route 28 are already in design. Because Route 28 is being upgraded to a limited access highway, interchange ramps are the only way to accommodate access and crossing roads. However, because of its strategic location between Ashburn and Sterling, Route 28 has the potential to become a major barrier to bicycle and pedestrian travel between two of the largest communities in Eastern Loudoun. Currently, the W&OD Trail is the only bicycle and pedestrian access across Route 28, and its SE/NW alignment limits its ability to serve many future bicycle and pedestrian trips that need to cross Route 28.



Interchange Policy

1. Request that the Route 28 project include appropriate bicycle and pedestrian accommodations through all of the Route 28 interchanges, including Routes 606, 625, 638 and 846, and consider an exclusive bicycle and pedestrian crossing at Severn Way West.

Class 4 --W&OD Trail Crossings and Access Needs: Three at-grade road crossings of the W&OD Trail are identified in the Plan as PIAs in need of crossing safety improvements: Belmont Ridge Road, Ashburn Road and Sterling Blvd. Additionally, seven locations for access improvements (see Table 5-5) are indicated on the Network Map as Neighborhood Linkages (purple triangles).

Trail crossing safety improvements: Current Northern Virginia Regional Park Authority (NRVPA) policy requires that all new roads and road widening projects must provide overpasses or underpasses for the Trail. NRVPA underpass standards prohibit tunnels and include high quality guidelines to ensure safe and secure underpasses, or modestly-sloped trail overpasses.

Current CTP roadway plans will result in future grade separations at Belmont Ridge Road, Claiborne Parkway (under design), Smith Switch Road, Pacific Blvd., Atlantic Blvd., and Church Road (under design).

However, for trail/road intersections that are likely to remain at-grade for many years, crossing safety improvements should be implemented. The following types of treatments should be considered: upgraded warning signs, use of high visibility crosswalks, use of median refuges, painted rumble strips for the roads, trail bollard or chicane designs that require slower bicycle/skater crossings and allow cyclists to stop without dismounting, lighting, and/or electronic trail sensors tied to motorist warning lights.

Trail access improvements: Maintaining bicycle and pedestrian access from bikeways and walkways along the crossing road is not a part of the current NVRPA requirements and is frequently reduced or lost with grade separation projects. In Loudoun County an example of this is where Loudoun County Parkway crosses the Trail. Moreover, grade separation design does not always favor trail users. Frequently roadway design requirements dictate that the trail be taken up and over the road, requiring the trail users (who travel without motorized power) to raise their elevation, rather than road users.

Locations where new or improved access to the trail is proposed in this Plan are listed in table 5-5. In some cases connector trails are needed, in others, ramps from the crossing road. Some locations might be appropriate for increased trailhead parking.

Table 5-5: Proposed Trail Access Improvements

	Community	Location	Need
3	Ashburn	Belmont Green Park & Forest Farm Lane	Connector trail
4	Ashburn	Between Belmont Ridge and Ashburn Road	Connector trails from neighborhoods on north and south sides of the trail.
5	Ashburn	Ashburn Village Blvd.	Improved connector trails, ramps and signs.
6	Dulles/ Rte 28 Business Dist.	Loudoun County Parkway	Ramps and connector trail west across Broad Run.
7	Dulles/ Rte 28 Business Dist.	Pacific Blvd.	Ramps
8	Dulles/ Rte 28 Bus. Dist.	Atlantic Blvd.	Ramps

W&OD Trail Access Policies

1. Where new roadway construction triggers grade separation of the W&OD Trail and the crossing roadway, access ramps and/or trails from each side of the crossing road must be provided as a part of the grade-separation project. Moreover, design of the crossing structures shall minimize the elevation changes required for the trail or use a trail underpass design, which creates more favorable grade change sequences for trail users.

2. The County will seek funding for improving safety at the three at-grade trail intersections identified above.

3. In collaboration with the Town of Leesburg and the NVRPA, the County will seek funding for planning, design and construction access improvements at the eight sites listed above.

4. All new developments located along the W&OD trail within 0.50 miles are required to establish publicly accessible linkages and connector trails to the W&OD Trail for use by residents of the development and trail users in adjacent neighborhoods and developments.

Class 4 -- Traffic Calming: In the Revised CTP, the County has already adopted policy to "promote and implement traffic calming measures in all policy areas." Moreover the County will "seek to expand traffic calming through community based programs in the Suburban, Transition, Rural Policy Areas and Towns through the proposed Community Plan process, new development applications, and through collaboration with VDOT on rural collector and arterial roads." [30]

Traffic calming is one means of improving bicycle and pedestrian safety and access within improvement areas. This Plan identifies the following improvement areas where traffic calming measures are needed:

- Planting Field Road in South Riding
- White's Ferry Road
- Business Route 7 from Hamilton to Round Hill. This roadway serves as Main Street for Hamilton, Purcellville and Round Hill. The County, in coordination with these Towns, is developing an integrated economic development, planning and historic preservation effort based on the "Main Street" model to support towns' and county goal that the towns serve as functional, multi-modal centers in the Rural Policy Area. A traffic calming project similar to the Route 50 effort would be a strong complement to this ongoing effort.
- Route 9 through Town of Hillsboro. Route 9, from the West Virginia line to Route 7, is a fast, 2-lane road that is also the Main Street of Hillsboro. It is county policy not to increase the capacity of Route 9 to serve long distance commuters, which is consistent with efforts to make Hillsboro somewhat more negotiable by foot or bike. Traffic calming the length of the Town, if deemed beneficial by Town leadership, should be considered.
- Route 15 through Lucketts
- Route 287 through Lovettsville
- Broad Way East in Lovettville
- Intersection of Routes 662 and 9

Traffic Calming Policies

5C-6.9: Implement traffic calming treatments as components of roadway improvement projects, intersection improvement projects, other bicycle/pedestrian improvements, or as stand-alone projects.

7 Connections to Neighboring Jurisdictions

Making connections to neighboring jurisdictions is especially important to bicyclists in Loudoun County, but also to pedestrians. These connections are most important on the eastern and southern boundaries with Fairfax and Prince William Counties. Access across the Potomac River to the C&O Canal Towpath, Montgomery and Frederick Counties in Maryland is also important for recreational access and linkage to commuter rail services into Washington, D.C. Two key connections emerged related to West Virginia and the Appalachian Trail--at Route 7 and US 340. Purple stars are used on the Network Map to indicate all of the key inter-jurisdictional linkages.

The Network Map highlights the three Potomac River bridges as facilities that should provide improved bicycle and pedestrian accommodations when they are upgraded or rebuilt. These bridges are owned and operated by the Maryland Department of Transportation. The Plan also proposes consideration of new "bicycle and pedestrian only" ferry services. Two locations have been identified for further study, the old Edward's Ferry Crossing and Algonkian Regional Park. These could be public or private operations and be started as only limited seasonal and/or weekend services. They would augment the current White's Ferry service and enable recreational loops to be made using the C&O Canal Towpath.

Policy

1. Initiate further study of the bicycle and pedestrian ferry opportunities and pursue funding from the Recreational Trails Program if the concept is determined to be feasible.

2. The County will cooperate and share location and other information about each inter-jurisdictional linkage with the appropriate agencies in each respective jurisdiction.

D. Summary of Case Studies

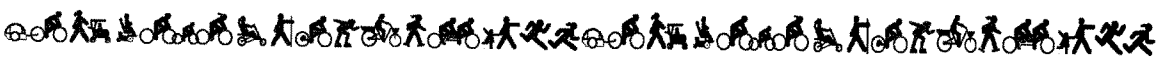
The Plan includes four case studies (see Appendix __) that illustrate the types of bicycle and pedestrian improvements that can be made in typical situations within the county.

- The Cascades Town Center study shows how intersections can be made more pedestrian friendly and how large collector roads can have bike lanes added within the existing right-of-way. This study also shows that with the use of connector trails, bike parking, and pedestrian access at the periphery, neo-traditional suburban retail development can be made more accessible to the residential communities surrounding them.

- The Clarke's Gap study addresses rural road and intersection design, traffic calming on arterial roads and accommodations for bicyclists and pedestrians in the highway environment. This difficult intersection is very near the W&OD Trail and is a major connecting point for cyclists and runners heading to and coming from the attractive country roads around Waterford.

- The Maple Avenue study in Purcellville looks at gaps in the sidewalk network and at improvements that can make intersections safer for pedestrians, especially young people going to and from a local high school.

- The Farmwell Station Middle School study in Ashburn looks at basic school access and safety issues. Because this school is adjacent to the W&OD Trail it will also examine trail security and how a major trail corridor can serve student bicycle and walking trips.



Chapter 6: Recommended Education and Safety Programs

A. Educating the Public and Community Leaders

Educating the public and community leaders about the values and benefits of improving conditions for walking and bicycling is important for at least two reasons. First, for this plan to succeed it needs to have broad support from the general public, the business community, and elected officials who set policy and approve budgets, not only in Loudoun County, but in Richmond and Washington, DC. Secondly, education of the general public is key to supporting the promotional efforts identified in the Plan. Increasing the numbers of people who choose bicycling and walking, and choose them more often, requires information exchange and education about the opportunities and benefits. For these reasons the Plan recommends a number of actions to ensure that this education process gets started.

Public and Community Education Policies

1. An ongoing citizens bicycle and pedestrian advisory body (see next chapter for details) shall develop a strategic media outreach plan to educate and promote the Plan to various constituencies within the County.
2. A field visit shall be conducted and led by the advisory body to educate public officials and community leaders about the Plan and the benefits of bicycling and walking.

B. Promoting Increased Bicycle and Pedestrian Activity

The National Capital Region Transportation Planning Board maintains a strong interest in local jurisdiction involvement in various types of promotional programs that are designed to reduce single occupant vehicle trips. They range from promoting carpools and vanpools and providing park and ride lots to promoting bike-to-work day, and telecommuting. Loudoun County is already involved in annual bike-to-work day activities; however additional promotional opportunities can be undertaken to expand the numbers of people bicycling and walking for transportation. More bicycle and pedestrian trips will translate directly in terms of congestion relief and pollution reduction.

Marketing the recreational bicycling and hiking areas of Western Loudoun and the County's great access to long distance trails is also an opportunity for strategic promotional activities. Realizing economic benefit from appropriate use of trail and rural road resources can support the County's goals of preserving and protecting the Western Loudoun landscape. Hiking and bicycle touring is a low impact tourist experience that can bring dollars to many small town businesses, villages, rural museums, and other cultural institutions that need support and visitation, but do not desire overwhelming numbers of cars or people.

For transportation as well as recreation-oriented improvements, facility and service development and promotion and marketing need to be coordinated. As Loudoun County develops new facilities, new routes and services, it should schedule and implement promotion of those improvements to ensure early acceptance and recognition, which will lead to sustained growth in use over time.

The key to successful bicycle and pedestrian promotion activities is to provide staff and financial resources and develop a program that can guide a sustained effort. The same is true for safety education activities (see section C). For this reason, this Plan recommends a start up phase (years 1-3) where promotion and safety education activities are merged into one program with combined staff support.

Moreover, stepping-up promotion activities in phases is also recommended--starting with small tasks that with measurable impact and building toward the highest impact programs.

Promotion Policies

Initiate a combined Bicycle and Pedestrian Promotion and Safety Education Program in the near future. An outline of a phased promotion component follows:

Bicycle and Pedestrian Promotion and Safety Education Program

Phase 1: Provide increased support to promotion initiatives that are already underway in Loudoun County and in the region.

a. Increase the intensity of County participation in national/regional Bike to Work Day/Month (each year in May), Walk to School Day (October each year), and the Regional Bike Commuter Assistance Program (ongoing).

b. Develop a bicycle and pedestrian information website.

Phase 2: Initiate small-scale efforts in select neighborhoods and with select populations.

a. Organize community-based rides and walks to promote participation at the neighborhood level and market early improvements.

b. Collaborate with chambers of commerce, hotels and other tourist/visitor venues and organizations to promote biking and walking in the county.

c. Work with employers to establish employee incentive programs that promote bicycling and walking as heathly alternatives to automobile travel.

d. After installation of equipment to transport bicycles on buses, promote awareness of this new service.

e. Design and implement Pedestrian Wayfinding Sign projects and Signed Rural Bike Route Demonstration projects.

Phase 3: Launch Larger Initiatives

a. Collaborate with an existing non-profit organizations based in Loudoun County or the region that can work effectively with government and the private sector to implement promotional strategies, such as a large-scale bicycle ride or walking event.

b. Develop a Bicycle and Pedestrian Suitability map.

C. Traffic Safety Education

A significant amount of the public comment received over the course of this planning process expressed a desire for motorists to accord greater respect to bicyclists and pedestrians who are lawfully using roads and streets in the County. An effective strategy for addressing these problems must use the combined forces of three approaches: engineering, education and enforcement. Engineering approaches to safety and signage are addressed in the Design Toolkit. Education and enforcement are addressed below.

The Citizens' Advisory Committee strongly believes that safety education is needed for all road users, but especially for child bicyclists and pedestrians, and young drivers, because these efforts will reduce

the future needs for adult education. Educating the public about safe walking, bicycling, and driving rules and practices is a major objective of this Plan. Loudoun County is fortunate to realize that safety education and enforcement initiatives are needed well before bicycle and pedestrian fatalities and injuries have reached alarming levels. Significant County action in this area can be an effective preventative measure that can keep this public safety issues from becoming as problematic as it has for some surrounding jurisdictions. Two key policy recommendations follow below, along with a set of activities that should be pursued under a safety education program.

Traffic Safety Education Policies

1. Encourage the School Board to adopt a bicycle and pedestrian safety curriculum for use in K-5 and request state funding to initiate a Bicycle and Pedestrian Safety Education Pilot Project. The state of (Maryland has recently developed and tested a curriculum that would serve Loudoun County well, and is in the process of expanding its use throughout the state.)

2. The County will require distribution of bicycle and pedestrian safety education materials at the time of home purchase and/or home or apartment lease; when a bicycle is purchased, when athletic footwear is purchased and at pediatricians' offices.

3. The County develop a safety education program that can guide a sustained effort, where promotion and safety education activities are merged into one program with combined staff support. Recommended activities follow:

<u>Safety Education Component: Bicycle and Pedestrian Promotion and Safety Education Program</u>

Phase 1: Provide increased support to promotion initiatives that are already underway in Loudoun County and in the region.

a. Collaborate with existing regional and state pedestrian and bicycle safety education initiatives. .
b. Modify beginning-of-the-year safety education activities currently undertaken in Loudoun County Public Schools to include bicycle and pedestrian safety.
c. Initiate dialogue with the Loudoun County School Board about adopting a bicycle and pedestrian safety education curriculum for Loudoun County Public Schools, and pursue state funding to support implementation of a pilot program.
d. The County will facilitate interjurisdictional communication on law enforcement issues and coordination

Phase 2: Initiate medium-scale efforts with select populations and for select facilities.

a. Catalogue existing safety-related classes and courses and expand such course offerings by collaborating with local and national organizations with expertise in this area.
b. Make bicycle and pedestrian safety educational activities and materials accessible to residents and workers in Loudoun County whose first language is not English.
c. Organize outreach and education programs to inform users of the bicycle and pedestrian network how to be safe while traveling and encourage citizen groups to monitor the trail network on a volunteer basis.
d. Encourage the School Board to evaluate the Driver's Education Curriculum currently used in the Loudoun County Public School system, and recommend appropriate changes.
e. Educate County law enforcement personnel about traffic safety enforcement issues related to bicyclist and pedestrian safety.

f. Coordinate with the Northern Virginia Regional Park Authority (NVRPA) and affected neighborhoods, to explore the potential to light certain segments of the W&OD Trail to enable safe commuting in winter months.

Phase 3: Maintain Ongoing Programs and Launch Larger Initiatives

a. Develop a system of changeable message signs at 1-3 select locations on major highways to use primarily for communicating bicycle, pedestrian and motor vehicle traffic safety messages.
b. Provide regular media releases that communicate bicycle, pedestrian and motor vehicle traffic safety messages.

D. Security and Enforcement

Maintaining personal security for public activities and in public places is always an important aspect of bicycling and walking. Actual and perceived personal security is a significant factor that influences a person's decision to bicycle or walk, especially for women and children, and especially during non-daylight hours. Public perception of safety and security in a neighborhood and on public streets is a key component of determining an area's walkability and bikeability.

One of the single biggest factors that influences security in a public space is the level of use it receives. The greater the numbers of people that are out bicycling and walking on streets, sidewalks and trails, the safer they will be. The best deterrent to crime on streets and trails is the likelihood that it will not go unnoticed. Now that many people routinely carry mobile phones, quick access to authorities is usually available whereever people are out and about. Professional police patrols and volunteer neighborhood patrols provide formal support to the base of security that results from regular use.

Information shared by the Loudoun County Sheriff's Office for this Plan provides good background about current security trends and enforcement practices. County law enforcement officials are responsible for policing the W&OD Trail. Despite use increasing over the past ten years on this trail, both the Sheriff's Office and managing agency (NVRPA) report few problems with crime or other incidents on the trail. The W&OD trail has seen very few serious crimes over its 40 plus miles, and in Loudoun County especially. Nonetheless, a few incidents in the past have received a large amount of media coverage and raised community concerns.

Sheriff's Office patrol resources include a number of police cruisers with bicycle racks and bicycles, and officers who have received bicycle patrol training. The W&OD Trail is sometimes patrolled by officers on bicycles, and is accessible to police cruisers as well. Bicycle patrols are also used sometimes on community policing beats in Eastern Loudoun.

Security and Enforcement Policies

1. To ensure a sufficient level of personal safety and security on Loudoun's Bicycle and Pedestrian network will require application and coordination of a variety of approaches. Security activities should be targeted to the areas where problems are most likely to occur. Activities and approaches shall include the following:

a. Taking a strategic approach to landscaping, lighting, berming and other design issues that can enhance a sense of security.
b. Ensuring proactive management including proper signage and adopting and communicating rules for facility use and etiquette.
c. Installation of emergency response technology as needed, such as call boxes.

d. Designing facilities such as off-road paths, trail access points and bridges such that access for emergency response vehicles and personnel is not precluded.
e. Providing adequate levels of professional law enforcement throughout the various settings of the Network.
f. Supplementing professional law enforcement with volunteer and community-based patrols. This approach can used with great success on muti-use trails, and along walking and biking routes to school. Security at pedestrian underpasses used regularly by students going to and from school can be enhanced with regular or periodic volunteer patrols.

2. To ensure that security and safety enforcement activities can be cost-effectively targeted toward real, rather than perceived problem areas, data related to incidents and law enforcement response should be tracked and tabulated for reports to the permanent advisory body. Specific statistics shall be kept by the Loudoun County Sheriff's Office regarding reported personal security incidents involving bicyclists or pedestrians while using public roads, sidewalks, trails and paths. These data shall track incident location and type of crime, and if a vehicle is also involved. This data shall also track 911-emergency calls from bicyclists and pedestrians, and their geographic origin, even if an incident report is not ultimately filed. (Currently traffic crash data involving bicyclists and pedestrians is already tracked and compiled by the Sheriff's Office.)

Conclusion

Facilitating communication among stakeholders is key to ensuring that the Network is funded for development, managed, maintained, protected and used. Accordingly, the Plan places strong emphasis on education and safety programs.

Chapter 7: Recommended Institutional Framework

Improving conditions for bicycling and walking in Loudoun County will require a sustained effort. Because this is the County's first non-motorized transportation plan, the institutional resources to guide this effort are not yet in place. This section of the Plan recommends key actions that will begin the process of building institutional capacity to implement a multi-dimensional bicycle and pedestrian program.

A. Permanent Citizens' Advisory Body

The Citizens' Advisory Committee studied the question of establishing a permanent advisory body and concluded that doing so would be key to ensuring success of the Plan. A body of citizens able to educate, advise and act in formal relationship to County government is a common and proven approach for the advancement of bicycling and walking. It is used in jurisdictions across the country at all levels of government. In Loudoun, it should include citizen representatives from all parts of the county and each incorporated Town; it should also be representative of the variety of users of bicycle and pedestrian facilities.

Advisory Body Policies

1. The Board of Supervisors shall appoint and charge a permanent bicycle and pedestrian advisory body, and direct the appropriate County agency(s) to provide staff resources to support the committee's work.
2. The following tasks are recommended for inclusion in the body's charge:
   a. Monitor implementation of the Bicycle and Pedestrian Mobility Master Plan, and report to the Board of Supervisors regarding annual progress toward Plan completion.
   b. Advise the Board of Supervisors, Planning Commission, and County agency staff, regarding County policy and planning efforts with regard to their relationship to and impact on bicycling, walking and non-motorized travel.
   c. Maintain liaison with interdepartmental team of local government staff.
   d. Prepare periodic Plan updates (every 3 years).
   e. Review the annual workplan of the bicycling and walking program, prioritize implementation tasks and develop list of priority projects.
   f. Review current and proposed VDOT and County capital improvement programs to ensure that bicycle and pedestrian needs are incorporated into planning, design and construction of transportation projects.
   g. Provide a forum for the public to identify needs and concerns of bicyclists and pedestrians, and opportunities for improving safety and access, and implementing educational programs.
   h. Recommend and help implement education, promotion and safety programs.
   i. Facilitate partnerships with the private sector to involve them in program implementation noted above as well as facility funding, construction and maintenance, where appropriate.
   j. Maintain liaison with other County advisory bodies that address issues of common concern.

B. Program Implementation and Staffing

The most successful local jurisdictions to implement bicycle and pedestrian programs have hired staff with professional training in the area of bicycle and pedestrian transportation or related field. However,

other communities have started programs by identifying interested existing staff and providing significant support in the early years toward professional development and training. Still others have developed successful programs by providing minimal core staff and utilizing consultants to accomplish specific program activities. In any case, it is critical to identify and dedicate a meaningful measure of staff resources to the program.

Because a range of tasks and types of expertise will be needed to implement this Plan, a team of dedicated staff working part-time on these issues may be able to be as effective as assigning the entire job to one or two people. Rather than recommend a particular approach to staffing, this Plan offers a list of the specific tasks that will need to be undertaken at the staff level.

Program Implementation Tasks

a. Provide ongoing technical support to various staff and the permanent citizens' advisory body regarding use and maintenance of the Level of Service database, and implementation of the Level of Service Policy.
b. Coordinate and implement bicycle and pedestrian safety education priorities and programs identified in the Plan.
c. Coordinate and implement bicycle and pedestrian promotion programs, in conjunction with the permanent advisory body.
d. Provide technical support to staff involved in review of development plans to ensure proper inclusion of bikeways and walkways and related facilities.
e. Coordinate with VDOT staff to:
    - Ensure a thorough orientation to, and education about, the Plan.
    - Initiate and maintain discussions around proposed new bikeway and walkway design standards.
    - Initiate special joint VDOT/County studies identified in the plan related to intersections, interchanges, traffic calming and other issues.
    - Provide ongoing communication about the various plan priorities and actions to the appropriate departments, offices and staff within VDOT.
    - Identify and discuss budgetary and resource allocation opportunities and implications and prepare annual funding requests.
    - Ensure that location specific, roadway improvement planning studies properly address bicycle and pedestrian needs and considerations.
f. Review new roadway design and construction plans and roadway improvement project designs to ensure proper treatment of bicycle and pedestrian facilities.
g. Provide staff support to the permanent advisory body

Interdepartmental Advisory Team

In addition to ensuring that specific initiatives and ongoing tasks receive the attention needed, there will be a need for staff and agencies to coordinate their efforts. An interdepartmental advisory team was convened by the Planning Department for this project, and proved to be very effective at involving different county agencies and ensuring that all perspectives on issues were considered. The staff that participated in this group were also a valuable source of information about existing programs and issues that are central to bicycling and walking.

Implementation and Staffing Policies

1. The Board of Supervisors shall provide direction to the County Administrator (and appropriate Department Directors) with regard to staffing strategies that should be used to launch implementation of the adopted Plan. The Board shall provide funding authority to support its staffing strategies.

2. Formalize the interdepartmental advisory team that supported development of this Plan. Expand its membership to include representatives from town planning or public works staff.

C. Progress Assessment and Reporting

While the concepts of assessing and reporting progress are imbedded in the tasks of the citizens' advisory body and the staff, it is important to establish a framework for reporting that can be used to ensure successful implementation of the Plan. There are some assessment and reporting procedures that will need to be made routine. These include refreshing and updating the Level of Service database, prioritizing and budgeting for program initiatives and projects, periodic updating of the Plan, training staff and citizen advisors, and reporting on progress and achievements. These tasks may have resource implications as well and will need to be budgeted for. A general timetable for these activities is provided below (table 7-1).

Table 7-1

Program Maintenance Task	Frequency
Update and refresh Level of Service database.	Every 2 years.
Program budgeting and prioritizing projects for funding.	Annually
Updating the Plan.	Every 3 years.
Reporting on progress and achievements.	Annually, to the BoS and the public.
Training staff and advisory committee members.	One session offered annually.

Chapter 8: Funding Resources and Strategies

Developing a sustainable source of funding is necessary to budget for and implement construction and maintenance of walkways, bikeways and related facilities and programs. Commitment of federal, state, county and town transportation dollars will be necessary. To a small degree, funds from budgets outside of the transportation agencies can be used to supplement transportation funds when the project has a strong relationship to the mission of other agencies. Some components of the system will be built or funded by the private sector during the land development process. Contributions from foundations and local business can also be important, primarily for safety education and promotion programs or small-scale physical improvements.

The following nine recommendations provide a strategy for developing a sustainable and growing source of revenue for Loudoun's bicycle and pedestrian projects and programs.

A. Local Funding Base

Establishing an ongoing and dedicated source of local revenue to provide a funding base and source of matching funds for the bicycle and pedestrian program is essential.

This funding will be used to fund all types of activities including education, promotion, enforcement, planning and construction and maintenance of facilities. It will be used to fully fund certain activities, but also as matching funds to leverage a wide variety of other sources, including VDOT funds, federal transportation funds, non-transportation funding sources and grants from private foundations. An amount of $500,000 annually is recommended for the first 1-2 years, with eventual increases to $2-3 million and an aggressive effort to leverage this investment..

Potential Sources for Local Funding Base:

- County General Fund Revenue
- Local Gas Tax
- Use 10-20% of the 5% Transient Occupancy Tax
- Annual VDOT allocation for the County's Secondary Roads Program
- Bond Referendum (many communities across the nation have had success in this area)
- Local Sales Tax (a number of communities have included set-asides of a portion of local sales tax for transportation or "alternative" transportation.)
- HUD Community Development Block Grants
- Use one of the innovative funding measures noted in CTP policy #1: special taxing districts, Community Development Authorities (CDAs)[31]

Expand and Guide Local Funding Sources

The CTP has a chart summarizing Funding Sources by Facility Type.[32] A number of important funding sources are not checked for bicycle or pedestrian facilities. However, CTP policy statements reference use of a number of these funding sources for alternative transportation modes. If necessary, legislative or policy changes should be made to ensure that the following funding sources can be used to fund bicycle and pedestrian facilities and programs: Business Professional and Occupancy License (BPOL), Local Gasoline Tax, Special Tax Districts, and Impact Fees.

The revenue stream generated by the Public Private Partnership created for the Route 28/Dulles Airport area to fund the Route 28 improvements should provide full funding of bicycle and pedestrian facilities on all roads and bridges crossing Route 28 and going through

interchanges with Route 28. Additionally, this funding source should be used for the bikeways planned for Atlantic and Pacific, which were selected by the County as alternates to providing an off-road bikeway in the Route 28 corridor.

Local Funding Policies

1. Establish and dedicate an ongoing source of local revenue to provide a funding base and source of matching funds for the bicycle and pedestrian program.

2. Ensure that policies that govern existing local transportation funding sources cited above can be used for bicycle and pedestrian facilities and programs.

B. Federal Transportation Funding

An aggressive strategy for utilization of federal transportation funding programs is essential. Discretionary grant programs as well as Congressionally directed federal funds should be pursued. The key to accessing federal transportation funding is identifying what programs are most compatible for bicycle and pedestrian projects.

The following five discretionary grant programs are a good place to start: the Transportation Enhancements Program, the Recreational Trails Program, the Scenic Byways Program, Section 402 Safety Program and the Hazard Elimination Program (safety set-aside).

A specific strategy will need to be developed for each program based on the funding cycles, project eligibility, and amounts of funding that are generally available. Most of these programs are administered by VDOT. The Scenic Byways Program is a national discretionary grant program, but states must sponsor local applicants, and the Recreational Trails Program is administered by the Virginia Department of Conservation and Recreation.

Funding for County projects can be directed by Congress, as well. Emphasis should be placed on identifying candidate projects to Congressional Representatives for funding through the six-year national transportation authorizing legislation (TEA-3 High Priority projects) and annual federal appropriations bills.

This funding strategy is ideal for projects that have widespread community support, are high profile, have higher costs, or are related to other large federally-funded transportation or other projects. Some examples include:

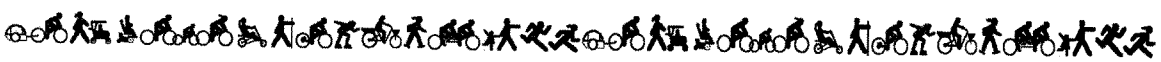
- The proposed trail in conjunction with the Metrorail Extension to Dulles International Airport and Loudoun County.
- A new bicycle/pedestrian bridge over Route 7 in the Cascades Town Center area.
- Improvements to W&OD Trail/Road Intersections and points of access.
- The proposed trail around Dulles International Airport

This funding strategy is also recommended as a way to access the Transportation and Community and System Preservation Pilot Program (TCSP) of TEA-21. This program is oriented to "cutting-edge" transportation projects with an orientation toward pollution reduction, single occupant auto trip reduction and other community benefits.

Federal Funding Policies

1. The County will prepare 2-3 federal funding requests annually for the programs identified in this section.
2. The County will identify candidate projects to Congressional Representatives for funding through appropriate federal legislation.

C. Virginia Transportation Six-Year Program



Where there is overlap with existing programmed roadway improvements, bicycle and pedestrian facilities can be integrated into road projects already identified in the Virginia Transportation Six-Year Program and the Secondary Roads Program for Loudoun County. Timing is an issue here. This may be an effective approach only for projects that are programmed for the "out years."

It is also important to ensure that future updates of the VTP include needed bicycle and pedestrian facilities. These may be in conjunction with road improvements or as independent projects.

- Take advantage of new VDOT policy, as of 12/19/02, which allows routine VDOT road construction funds to be used for independent bicycle facility projects, i.e. those that are not a part of a larger road improvement project.
- Existing VDOT policy allows local jurisdictions to request inclusion of bicycle and pedestrian facilities as a part of requested road improvement projects on the Primary System, Secondary System or Urban System. Local jurisdictions must share the construction costs with VDOT 50% / 50%, however, VDOT will fund 100 percent of additional preliminary engineering and right-of-way costs that result from adding the bikeway elements. Cost Sharing for Urban System projects is the same for the bicycle facility costs as for regular road improvement projects.
- Procedures for local jurisdictions to fund walkways and bikeways in this manner are detailed in both the VDOT Bicycle Facility Resource Guide and in the Loudoun County Revised Countywide Transportation Plan.

State Funding Policies

1. Where there is overlap with programmed roadway improvements, integrate bicycle and pedestrian facilities identified in this plan into projects already listed in the Virginia Transportation Six-Year Program (VTP) and the Secondary Roads Program for Loudoun County.

D. Regional Transportation Funding

Certain projects may be those most suited for funding through the federal Surface Transportation (STP) and Congestion Mitigation and Air Quality Improvement (CMAQ) programs, and other VDOT funding programs where the Metropolitan Planning Organization coordinates the programming of available funds.

Regional Funding Policy

1. Identify candidate projects for funding requests through the Transportation Coordinating Council of Northern Virginia.

E. Non-Transportation State Programs

The state of Virginia has a few state programs for which some bicycle and pedestrian projects are eligible. The following programs may be a worthwhile source of revenue.

a. State Revenue Sharing
b. State Recreational Access Funds
c. Virginia Tourism Corporation (Cooperative Marketing Fund or the Matching Grants Marketing Program)

Recommendations:

1. The County will actively research and track potential funding sources from non-transportation related programs.
2. The County will prepare requests for these funding sources as eligible projects are identified.

F. Private Funding Sources

Some key private funding sources and strategies include the following:

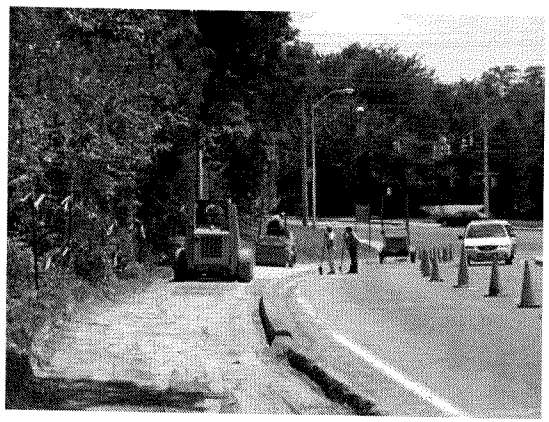
- The Bikes Belong Coalition (The Bicycle Industry's Advocacy Funding Arm)
- Large, locally-based corporations.
- Targeted community- or project-based fundraising efforts.
- Develop Partnerships with Individual Home Owner Associations.

Private Sector Funding Policies

1. Request funding from private sources, develop public/private partnerships and encourage the formation of a local non-profit organization that can seek and receive funding from private foundations.

Chapter 9: Implementation Strategy

Implementation of this Plan will require effective partnerships among many agencies, jurisdictions, and community leaders. A wide variety of policies, programs, and construction projects are recommended in this Plan, with the vision of making Loudoun County fully accessible to pedestrians and bicyclists. The task will not fall on any one single jurisdiction or agency alone – rather it will require a cooperative effort among state and local jurisdictions, the development community, and citizen advocates.



The strategies and actions in the preceding chapters set forth tasks critical for success. Some actions should be commenced in the near term to build upon the knowledge and resources gained during the development of this Plan. Other actions will naturally follow and will be determined, in a large part, by opportunities that emerge in the future.

Implementation priorities for the initial 5 years of the Plan is provided in this chapter, however the timing for each action will ultimately be determined through discussion and consensus-building, as well as the availability of financial resources. Priority actions that are considered the most "doable" are listed separately. This chapter establishes a work plan as a starting point – as items on this list are accomplished, the work plan should be reevaluated to assess new priorities and actions that are needed.

High Priority Actions: Years 1-5

12. Establish and dedicate an ongoing source of local revenue to provide a funding base and source of matching funds for the bicycle and pedestrian program.

13. Incorporate policies set forward in this Plan into practice through revisions to the FSM, revisions to zoning and subdivision ordinances, and modifications to standard procedures.

14. Ensure that every opportunity is used to improve bicycle and pedestrian conditions along the Major Road and Connecting Corridors listed in this Plan.

15. Work with VDOT to ensure that the agency also integrates these policies into its approach to roadway planning and design in Loudoun County. Work closely with VDOT on specific road projects to ensure bicycle and pedestrian facilities are fully incorporated into the design and construction, per the recommendations of this Plan.

16. Develop an interdisciplinary bicycle program and establish a full-time bicycle and pedestrian coordinator position.

17. Establish an ongoing citizens' bicycle and pedestrian advisory body, with responsibilities as identified herein.

18. Apply for Enhancement funding to plan, design and construct a bridge over Route 7, as identified in this Plan.

19. Initiate feasibility studies for off-road corridors identified in this Plan, and proceed with development of those corridors deemed feasible.

20. Encourage the Towns to adopt the Network Map, or suggest amendments for the Network within the Towns.

21. Insist that VDOT incorporate bicycle and pedestrian improvements in accordance with this Plan and in all projects in Loudoun County.

22. Identify most needed areas for pedestrian and bicycle improvements for implementation as funds become available.

Priority Improvements: Quickest and Least Expensive

1. Request that the Dulles Rail Extension Trail be included in the planning, design and funding activities currently underway.

2. Request that the Route 28 project include appropriate bicycle and pedestrian accommodations through all interchanges.

3. Seek funding to implement one Neighborhood Connector project per year, and three major intersection improvements per year.

4. In partnership with tourism officials, conduct a field study of the two Rural Bicycle Touring Routes identified in this Plan, develop a designation plan and install signs on these routes.

5. Install bicycle storage lockers at all park-and-ride lots.

6. In partnership with the School Board,, establish a pilot Safe Routes to School program in Loudoun County, per the recommendations of this Plan.

7. Participate in Walk a Child to School Day in October of each year, encourage more schools to take part in the event each year. Continue to assist/sponsor Bike to Work Day activities.

Endnotes

[1] JAMA - Journal of the American Medical Association, October 1999.
[2] Nationwide Personal Transportation Survey, Federal Highway Administration, 1990.
[3] Pathways for People II, Rodale Press commissioned Harris Poll, 1995
[4] Obesity Trends web page, Center for Disease Control, National Center for Chronic Disease Prevention and Health Promotion Website, 2003 (http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/index.htm)
[5] ibid
[6] ibid
[7] JAMA - Journal of the American Medical Association, October 1999.
[8] U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity. 2001 http://www.surgeongeneral.gov/library
[9] Obesity Trends page, Center for Disease Control, National Center for Chronic Disease Prevention and Health Promotion Website, 2003 (http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/index.htm)
[10] Effective March 25, 2003. U. S. Environmental Protection Agency. (www.epa.gov/oar/oaqps/greenbk/ofr2rpt2.html).
[11] "..for a 7.5 mile trip, starting the car cold generates about 16 percent more NO_x and 40 percent more CO than starting the car when it is warm." Federal Highway Administration Website: Transportation Air Quality – Selected Facts and Figures, Vehicle Emmissions. http://www.fhwa.dot.gov/environment/aqfactbk/factbk13.htm
[12] Study conducted by Bruce Burgess, Bicycle Holidays, Inc., Middlebury, VT, 1992
[13] CTP, p.1-2.
[14] Revised Countywide Transportation Plan (CTP), p. 1-2, July 2001.
[15] Ibid, pp. 1-3 – 1-4
[16] Revised CTP, Policy 17, p. 2-14
[17] July 15, 2002, Board of Supervisors Action Item
[18] Based on survey data and information provided by Loudoun County Public Schools, Department of Transportation.
[19] Washington and Old Dominion Trail: A Study of Trail Users, Northern Virginia Regional Park Authority, March 1998
[20] This analysis was conducted for this Plan. A summary is provided in Appendix C.
[21] *Level of Service Standards*, CTP 4-5 – 4-6
[22] Loudoun County selected the Bicycle Level of Service Model (Version 2.0) developed by Sprinkle Consulting, Inc. It is based on research documented in Transportation Research Record 1578, published by the Transportation Research Board (TRB) of the National Academy of Sciences. For pedestrian level of service the County selected the Pedestrian Level of Service Model developed by Sprinkle Consulting, Inc. in cooperation with the Florida Department of Transportation, documented in TRR 1773 by the TRB. For details about these models see Appendix D.
[23] All major and a few minor roads in Loudoun County were included in the study network. Dirt roads studied were not assigned a BLOS grade; nor were unbuilt CTP roads.
[24] Dirt roads were assigned a PLOS grade, because pavement quality is not a factor in PLOS evaluation.
[25] In some developed areas of the county, constraints may exist that make it difficult to provide typical sidewalks and bikeways. Alternative solutions should be explored in order to accommodate these users.
[26] University of North Carolina Highway Safety Research Center. *Florida Department of Transportation, Florida's Pedestrian Planning and Design Guidelines*, Tallahassee, FL, 1999.
[27] Presentation by Dan Burden, March 2003.
[28] See County policy regarding options for local control and management of roads, CTP 4-6 – 4-7
[29] Some elementary schools that are located on minor roads are not directly linked by roads selected for the Network.
[30] Revised Countywide Transportation Plan, 2001, pp. 3-15 – 3-16
[31] CTP p. 5-1
[32] CTP p. 5-7

APPENDIX A:
Glossary of Terms

The following terms and definitions are provided for the readers of the Loudoun County Bicycle and Pedestrian Mobility Master Plan. This glossary was originally developed and used throughout the planning process to help CAC members, IDAT representatives and members of the public to develop a common language for discussing bicycle and pedestrian issues.

Accessible Pedestrian Signal (APS) – A device that communicates information about pedestrian signal timing in non-visual format, through the use of audible tones (or verbal messages) and vibrating surfaces.

Americans with Disabilities Act (ADA) – The 1990 Federal law establishing the civil rights of people with disabilities. Prohibits discrimination against people with disabilities and requires common places used by the public to provide an equal opportunity for access.

Bicycle – Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term "bicycle" in this planning process also includes three and four-wheeled human-powered vehicles, but not tricycles for children.

Bicycle Facilities – A general term denoting improvements and provisions made to accommodate bicycling, including bike lanes, shared-use pathways, signed bike routes, bicycle parking racks and storage lockers. The term *accommodation* can also be used. The term *facility* is commonly used in the transportation industry to refer collectively to the various infrastructure elements that make up transportation systems, stations, etc.

Bicycle Network - A system of public bicycle facilities that can be mapped and used by bicyclists for transportation and recreational purposes.

Bikeway – A generic term for any road, street, path, or trails specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Bike Lane -- A portion of a roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Buffer – That portion of a highway, road or street between the curb-face or edge of the pavement and the sidewalk that provides a spatial buffer between vehicular traffic and pedestrians on sidewalks. Buffers often include landscape plantings such as grass, trees or shrubs, or utility poles, and may also be referred to as the "planting strip," "landscape buffer," "tree buffer" or "tree boxes." Buffers can also include barriers such as highway guide rails (guardrails) or bollards.

Crosswalk – The horizontal portion of roadways, usually at intersections, reserved for pedestrian crossing; it may be marked or unmarked. Three marking patterns using white striping are most common: 1) Double Parallel lines, 2) "Zebra Stripes:" white cross hatches perpendicular to the pedestrian direction of travel, or 3)

"Ladder:" perpendicular white cross hatches combined with double parallel lines on the outside edges.

Curb Ramp – A combined ramp and landing to provide access between street level and sidewalk level, usually at intersections or designated crosswalks. ADA accessible ramps must achieve particular design requirements including a running grade no steeper than 1:20.

Detectable Warning – A standardized surface feature built in or applied to walking surfaces or other elements to warn people who are visually impaired of specified hazards.

Median Refuge – An area within an island or median that is intended for pedestrians to wait safely away from travel lanes for an opportunity to continue crossing the roadway.

Midblock Crosswalk – A legally established crosswalk that is not at an intersection.

Pedestrian – A person walking, including traveling by means of a wheelchair, electric scooter, crutches or other mobility aid. Use of the term pedestrian is meant to be comprehensive and includes all disabled individuals as well as runners, joggers, in-line skaters, those using push scooters, those using strollers, carriages, carts and wagons.

Pedestrian Access Route – A corridor for pedestrian travel through the public right-of-way that meets design standards that ensure its accessibility.

Pedestrian Crossing Interval – The combined phases of a traffic signal cycle provided for a pedestrian crossing a roadway in a crosswalk. The interval usually includes the WALK interval plus the pedestrian clearance interval.

Pedestrian Signal Indication – The illuminated WALK/DON'T WALK message (or walking person/hand symbols) that communicates the pedestrian phase of a traffic signal, and their audible and tactile equivalents.

Shared Roadway – A roadway that is open to both bicycle and motor vehicle travel. Unless bicycle travel is explicitly prohibited, all highways, roads and streets are "Shared Roadways." Some Shared Roadways may have wide curb lanes (14' or greater) or paved shoulders, to increase comfort for bicyclists; however in most cases these roads do not have sufficient width to accommodate a Designated Bike Lane.

Shared Use Path (or Pathway) -- A bicycle and pedestrian path separated from motorized vehicular traffic by an open space, barrier or curb. Shared-Use Paths may be along a roadway (often termed "sidepath") or within an independent right-of-way, such as an abandoned railroad bed. Shared use paths typically accommodate two-way travel as well as pedestrians, in-line skaters, wheelchair users, joggers and other non-motorized path users.

Signed Shared Roadway (Signed Bike Route) – A shared roadway that has been designated by signs as a preferred route for bicycle use.

Sidewalk – That portion of a highway, road or street specifically constructed for the use of pedestrians on the outside edge of the vehicular travel way. Sidewalks are typically, but not always, curb-separated from the roadway and made of concrete, brick, asphalt or other hard surface materials.

Shoulder -- Any portion of a roadway to the right of the right-most travel lane, but not including curbs, planting buffers and sidewalks. Shoulders can have a variety of surface treatments including pavement, gravel or grass. Depending on their width and surface,

they serve a variety of purposes, including providing space for vehicles to slow and turn right, accommodation of stopped vehicles, to allow emergency vehicles to pass, for structural support of the roadbed, or for bicycle and pedestrian travel.

Trail – The word "trail" has come to mean a wide variety of facilities types, including everything from a *"marked or beaten path, as through woods or wilderness"* to a paved *"multi-use trail"* such as the W&OD trail. The same word "trail" is used to describe hiking trails, equestrian trails, Indian trails or even tourist-oriented driving routes such as Virginia's Civil War Trails. For this reason, this plan does not use the word "trail" to reference a facility intended for bicycle transportation. We urge use of the term *Shared Use Path* in place of *Multi-Use Trail*

APPENDIX B
Bicycle and Pedestrian Level of Service Models

The Bicycle and Pedestrian Level of Service models (BLOS / PLOS) are an evaluation of bicyclist and pedestrian perceived safety with respect to motor vehicle traffic and comfort in using the roadway corridor. It identifies the quality of service for bicyclists or pedestrians that currently exists within the roadway environment. Following the description of these models, the data requirements and data collection and compilation guidelines are also provided.

1) Bicycle Level of Service Model

The statistically-calibrated mathematical equation entitled the *Bicycle Level of Service (Bicycle LOS)[i] Model (Version 2.0)* will be used for the evaluation of bicycling conditions in the Loudoun. This model is the most accurate method of evaluating the bicycling conditions of shared roadway environments. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the *Model* clearly reflects the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicle speed and type, and on-street parking.

The *Bicycle Level of Service Model* is based on the research documented by the Transportation Research Board of the National Academy of Sciences footnote. It was developed using data from over 150,000 miles of evaluated urban, suburban, and rural roads and streets across North America. Many urban planning agencies and state highway departments are using this established method of evaluating their roadway networks. These include Anchorage AK, Baltimore MD, Birmingham AL, Buffalo NY, Gainesville FL, Houston TX, Philadelphia PA, Lexington KY, Sacramento CA, Springfield MA, Tampa FL, as well as the Delaware Department of Transportation (DelDOT), Florida Department of Transportation (FDOT), New York State Department of Transportation (NYDOT), Virginia Department of Transportation (VDOT) Maryland Department of Transportation (MDOT) and many others.

Widespread application of the original form of the *Bicycle LOS Model* has provided several refinements. Application of the *Bicycle LOS Model* in the metropolitan area of Philadelphia resulted in the final definition of the three effective width cases for evaluating roadways with on-street parking. Application of the *Bicycle LOS Model* in the rural areas surrounding the greater Buffalo region resulted in refinements to the "low traffic volume roadway width adjustment". A 1997 statistical enhancement to the *Model* (during statewide application in Delaware) resulted in better quantification of the effects of high speed truck traffic. As a result, *Version 2.0* has the highest correlation coefficient ($R^2 = 0.77$) of any form of the *Bicycle LOS Model.*

Version 2.0 of the *Bicycle Level of Service Model (Bicycle LOS Model)* has been employed to evaluate collector and arterial roadways within Loudoun County.

2) Pedestrian Level of Service Model

Similar to the evaluation procedure used for the bicycle model, this is an evaluation of pedestrians' perceived safety with respect to motor vehicle traffic and comfort in using the roadway corridor. It identifies the quality of service for pedestrians that currently exists within the roadway environment.

The *Pedestrian Level of Service (Pedestrian LOS) Model* was used for the evaluation of walking conditions on road and street corridors in Loudoun County. This model is the most accurate method of evaluating the walking conditions within shared roadway environments. Like the Bicycle Level of Service Model, it is based on the research documented by the Transportation Research Board of the National Academy of Sciences[ii]. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the *Model* clearly reflects the effect on walking suitability or "compatibility" due to factors such as roadway width, presence of sidewalks and intervening buffers, barriers within those buffers, traffic volume, motor vehicles speed, and on-street parking.

Appendix C
Bicycle and Pedestrian LOS Results

See maps of bicycle and pedestrian level of service results in the map pocket. A statistical summary is provided below. The Pedestrian LOS map also serves as the map of the entire LOS study network.

Loudoun County Bicycle and Pedestrian Level of Service Summary

Total Study Network

	Miles	% of Miles	Segments
Total Study Network	**842.0**	**100.0**	**1042**
Total Network with BLOS Grade	573.8	68.1	712
Total Network with PLOS Grade	735.7	87.4	867
Unpaved Roadways	161.9	19.2	155
Future Roadways	106.3	12.6	175

Bicycle Level of Service	**Miles**	**% of Miles with BLOS**	**Segments**
A	103.6	18.1	226
B	92.7	16.2	113
C	96.2	16.8	109
D	109.6	19.1	114
E	102.6	17.9	100
F	69.1	12.0	50
Total	**573.8**	**100.0**	**712**

Pedestrian Level of Service	**Miles**	**% of Miles with PLOS**	**Segments**
A	11.0	1.5	30
B	71.1	9.7	141
C	77.0	10.5	131
D	437.7	59.5	450
E	129.4	17.6	108
F	9.5	1.3	7
Total	**735.7**	**100.0**	**867**

	Miles	**% of Miles with PLOS**	**Segments**
Segments with Sidewalk	101.7	13.8	218
Linear Miles of Sidewalk	134.1		
Segments with Sidepath	46.9	8.2	69
Linear Miles of Sidepath	69.9		

*There are 10.8 miles (14 segments) with both sidewalk and sidepath

CTP Roadway Network

	Miles	% of Miles	Segments
CTP Roadway Network	**480.7**	**100.0**	**597**
CTP Network with BLOS Grade	355.0	73.9	370
CTP Network with PLOS Grade	376.1	78.2	425
Unpaved Roadways	21.1	4.4	55
Future Roadways	104.6	21.8	172

Bicycle Level of Service	**Miles**	**% of Miles with BLOS**	**Segments**
A	31.8	9.0	64
B	26.2	7.4	41
C	57.4	16.2	59
D	83.0	23.4	78
E	95.8	27.0	90
F	60.7	17.1	38
Total	**354.9**	**100.0**	**370**

Pedestrian Level of Service	**Miles**	**% of Miles with PLOS**	**Segments**
A	3.0	0.8	5
B	22.3	5.9	30
C	37.2	9.9	53
D	177.9	47.3	228
E	126.5	33.6	103
F	9.3	2.5	6
Total	**376.2**	**100.0**	**425**

	Miles	**% of Miles with PLOS**	**Segments**
Segments with Sidewalk	25.6	6.8	40
Linear Miles of Sidewalk	30.4		
Segments with Sidepath	34.1	9.6	46
Linear Miles of Sidepath	53.6		

*There are 7.4 miles (8 segments) with both sidewalk and sidepath

APPENDIX D
Level of Service Policy – Explanation of Table 4-2

General Requirements

a) It is expected that bicyclists and pedestrians will be present and/or desire to use all roads and streets in the county that are in areas where people live, work or enjoy recreation. Moreover, bicyclists and pedestrians are also expected to be attracted to very rural roads as well, to enjoy for recreational bicycling and hiking. As development spreads and increases, it is expected that the demand for bicycle and pedestrian access will only increase.

b) Estimated future Level of Service calculations made for any roadway, to test its design for the purposes of meeting the Level of Service Standards in this policy, shall use the same data describing the road and its expected traffic volumes that is used to determine its projected level of service for motor vehicle traffic.

In What Cases do Level of Service Standards Apply?

a) **Planning and Design of Land Developments** (Condition 1 in Table 4-2): when development proposals are required to evaluate and describe their impacts on existing and future motor vehicle levels of service, they shall also be required to evaluate their impacts on existing and future bicycle and pedestrian level of service. Projects shall be required to mitigate negative impacts to bicycle and pedestrian transportation by making roadway improvements that retain acceptable minimum LOS, or improve existing bicycle and pedestrian levels of service per the minimums described in Table 4-2. Other mitigation methods may also be considered, including 1) paying impact fees into a County fund that will be used to implement bicycle and pedestrian improvements or 2) providing improvements that create public bicycle and pedestrian access across the site via shared use paths that contribute to the public bicycle and pedestrian transportation network.

b) **Planning and Design of New Roads** (Condition 1 in Table 4-2): When new roads and streets are being planned on new rights-of-way (such as CTP roads or streets within new developments), they will be designed and constructed to achieve a Level of Service meeting or exceeding that for Condition 1 in Table 4-2. Exceptions may be considered as per the exceptions listed below.

c) **Planning and Design of Improvements to Roads and Streets in Select Policy Areas** (Condition 2 in Table 4-2): Within the following Policy Areas, when improvements are planned for existing highways, roads and streets, they should be designed and built to achieve the highest level of bicycle and pedestrian service possible and shall not result in LOS below the minimums listed for Condition 2 in Table 4-2.

- All Suburban Policy Areas
- All Transition Policy Areas
- All Joint Land Management Areas

d) **Planning and Design of Improvements to Select Roads and Streets in the Rural Policy Areas** (Conditions 3-3b in Table 4-2): Within the Rural Policy Areas, when improvements are planned for existing roads that are included in the Rural Network, as defined by this Plan, they

should be designed and built to achieve the bicycle and pedestrian levels of service minimums described in Condition 3, and 3a-b in Table 4-2. The design of bikeways and walkways along these roads will take into consideration safety, heritage resources, topography, available right-of-way, and various user groups.

e) **Planning and Design of All New Roads and Improvements to Existing Roads Near Schools:** Conditions 2a and 3c describe the areas around schools that should be improved to maximize both the number of students that can walk or bicycle to and from school while ensuring their safety using the road and street system.

f) **Planning and Design of Improvements to Roads and Streets in Incorporated Towns, where Towns have adopted LOS minimums.** It is recommended in this Plan that the Towns of Leesburg, Purcellville, Lovettsville, Round Hill and Hamilton adopt the LOS standards detailed in Conditions 1, 2 and 2a in Table 4-2. Other Towns are encouraged to adopt these same LOS standards or those described in Condition 3b.

<u>On What Roads Do Level of Service Standards Apply and Not Apply</u>?

Generally, LOS standards apply to all roads whose functional classification ranks between residential street and limited access highway, with some exceptions and caveats, see the following.

a) They <u>do not apply</u> on Limited Access Highways where VDOT or County policy does not allow bicycle or pedestrian access, including the Dulles Greenway. If future limited access highways are planned for Loudoun County, the need for bicycle and pedestrian access along the new highway should be considered as part of the early planning for the road and a determination made regarding the provision of bicycle and pedestrian facilities as a part of the road or road corridor.

b) LOS standards <u>do apply</u> to the Route 15 Bypass in Leesburg from Route 7 north to its merger with Route 15 King Street. Moreover, while LOS standards do not need to be applied to the Route 7 Bypass in Leesburg, as per CTP policy bicycle and pedestrian accommodations should be considered in this corridor.

c) LOS standards <u>do not apply</u> to unpaved roads that by policy are to remain unpaved in their ultimate conditions, nor do they apply to alleys, short cul-de-sacs, and private roads.

d) LOS standards <u>apply</u> only to those roads in the Rural Policy Areas that are identified in this plan as part of the Bicycle and Pedestrian Network.

e) While LOS grades are not currently available for all existing residential streets and minor commercial streets, LOS standards <u>do apply</u> to these functional classifications of roads.

<u>Making Exceptions to Level of Service Minimum Standards</u>

In general, exceptions to the minimum Level of Service can be made for extenuating circumstances. Some or all of the following factors may be appropriate to consider when seeking a LOS exception under Conditions 1, 2, 3b listed in Table 4-2.

- what is physically feasible given environmental and built constraints, including heritage resources, topography, available right-of-way, etc.
- what is appropriate given adjacent land uses,

- if there are parallel routes that meet minimum BLOS on nearby roads or trails that serve the same transportation connections with a similar level of directness and convenience.
- how various design alternatives impact and balance each mode's quality of service and safety,
- what the public desires,
- what is cost effective.

APPENDIX E
Facility Maintenance Schedule

The first step in developing a maintenance program is to identify what tasks need to be undertaken and who is responsible for each task. The maintenance schedules below lay out potential maintenance tasks, and the likely frequency of these tasks. The County's Office of Transportation Services and VDOT should jointly determine which agency will be responsible for coordinating the execution of on-road bikeway maintenance and who will be the point of contact for citizens with questions regarding maintenance.

Recommended Sidewalk Maintenance Practices

Sidewalk maintenance will be necessary and will be performed by the agency or property owner that owns the sidewalk. Sidewalk maintenance should include periodic inspection, sweeping and edging, mowing during spring and summer months, vegetation trimming, and spot repairs.

Inspection and repair of broken sidewalks

Surface cracking indicates significant advancement of sidewalk deterioration. Extensive freeze and thaw cycles are major culprits for cracking. If the surface is allowed to continue to crack, vegetation may invade the crack and rapidly increase surface deterioration. Drain grates that are located in the path of pedestrian travel can also become a hazard if not properly maintained.

- Periodically check sidewalk surface of major pedestrian routes based on citizen request and random field checks.
- Check sidewalks for heaves and elevation changes that cause tripping hazards
- Vertical displacement of ¾" or greater for 12" of joint
- Horizontal displacements of greater than 1/2" for crack 3' or longer
- Repair cracks early before additional deterioration is encouraged.
- Repair or replace drain grates that create an uneven surface.

Drainage Improvements

Flowing or standing water will warp concrete sidewalks and create dips and potholes in roadway shoulders. Good drainage will help prolong the life of an accessible sidewalk. After periods of rain or snow melt, sidewalks and shoulders with puddles will be uncomfortable for pedestrians. Poor drainage may cause pedestrians to walk in the roadway or jump sideways suddenly to avoid a puddle, creating the risk of a crash. Drainage structures that are installed within the sidewalk area must not create a gap of more than 12.5 millimeters (½ inch) in the direction of travel.

- Raise catch basin grates flush with pavement;
- Modify or replace deficient drainage grates with bicycle-safe grates; and
- Repair or relocate faulty drains at intersections where water backs up onto the curb cut or into the crosswalk;

Vegetation

Vegetation encroaching into sidewalks is both a nuisance and a problem. Roots should be controlled to prevent break-up of the surface. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists.

- Cut back vegetation to increase pedestrian visibility, where appropriate
- Plant trees that are sidewalk friendly
- Remove hazardous roots, consult an arborist for safe tree root removal

Sweeping

An inspection and maintenance program based upon citizen request helps ensure that sidewalk litter is regularly picked up or swept. During extended icy conditions, it may not be cost-effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and everywhere after the winter season ends.

- Establish a seasonal sweeping schedule per citizen requests;
- Sweep sidewalks whenever there is a noticeable accumulation of debris

Winter Season Maintenance

Snow removal will ensure that the minimum five-foot width is accessible to all pedestrians. Sidewalk continuity will be disrupted if a single home or business does not remove snow from their portion of the sidewalk. When this happens, pedestrians are often forced to travel in the street with automobiles, which is especially dangerous in snowy and icy conditions. Property owners should also remove ice or apply appropriate traction materials to prevent slipping. Snow banks often block openings between sidewalks and marked and unmarked crosswalks, especially at mid-block locations. It is essential for highway agencies to note the locations of crosswalks and ensure that pedestrian access to them is maintained. Sidewalks and sidepaths should not be used for long term snow storage, and should be cleared of snow as soon a time, space and weather patterns permit. After snow melts, sidewalks and sidepaths should also be cleaned and swept.

Intersection Maintenance

Intersections should be checked yearly for maintenance of existing pedestrian facilities. Intersections can become pedestrian hazards if the facility controls are in need of maintenance and repair.

- Do spot checks for crosswalk wear and visibility and curb ramp deterioration
- Do spot checks for function of pedestrian signal activators, signal heads, signs and crossing intervals

RECOMMENDED PEDESTRIAN MAINTENANCE SCHEDULES

TASK	FREQUENCY	COMMENTS
Regular Inspection	Once a year	Includes all heavy pedestrian traffic sidewalk routes
Sidewalk Sweeping	As needed	Some sidewalks lined by street trees will need extra attention in the fall
Sidewalk repairs	As needed	Repair cracks or other problems on the sidewalks
Sidewalk snow removal	As needed	
Debris removal from sidewalk	As needed	Remove debris from sidewalk such as gravel, broken glass and dirt.

Major Pedestrian Intersections

TASK	FREQUENCY	COMMENTS
Regular Inspection	Once a year	Includes pedestrian signal and timing of major pedestrian intersections.
Curb Ramp Inspection	As needed	To maintain compliance with ADA
Signs and markings	As needed	Repair or replace signs and markings identified during inspections

Recommended Bicycle Maintenance Practices

Typically, additional on-road bikeway maintenance can be incorporated into regular roadway maintenance schedules, rather than being a separate program. VDOT will be responsible for maintenance of on-road bikeways and sidepaths that are within the roadway right-of-way.

Sweeping

Bicyclists often avoid bike lanes filled with sand, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. Debris from the roadway should not be swept into the shoulders or bike lanes, nor onto sidewalks; nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that debris in the travel way is regularly picked up or swept. During extended icy conditions, it may not be cost-effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and everywhere after the winter season ends.

- It is recommended that curbed roadway sections be swept on a regular basis, thereby including bike lane and shoulder sweeping on curbed roadways.
- Provide extra sweeping in the fall in areas where leaves and debris accumulate in bike lanes.
- The County should work with VDOT to establish a sweeping schedule for certain open roadway sections based on citizen requests or installation of bicycle and pedestrian improvements that are key components to the overall network.
- Provide extra sweeping, when necessary, in areas where debris regularly accumulates in bike lanes and wide shoulders areas.

Roadway Surface Repairs

A smooth surface, free of cracks, potholes, bumps and other physical problems should be provided and maintained.

- Respond to citizen reports of maintenance needs in a timely manner;
- Repair potentially hazardous conditions as soon as possible;
- Prevent the new edge of a road surface repair from running through the center of a bike lane; and
- Sweep a project area after repairs.

Pavement Overlays

Pavement overlays are good opportunities to improve conditions for cyclists. In uncurbed sections, they often offer an opportunity to widen a roadway to provide additional paved space for bicycling. Or they may offer an opportunity to re-stripe a roadway with a layout that includes bike lanes, or a wider striped and paved shoulder. All VDOT pavement overlays should be coordinated with County Bicycle and Pedestrian staff with sufficient lead time to plan and design "quick hit" bicycle service improvements that can be accomplished with pavement striping and minor additions of pavement width.

It is also important that pavement overlays be executed carefully. A ridge should not be left in the area where cyclists ride (this occurs where an overlay extends partway into a bike lane).

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge;
- Raise drainage inlet grates, manhole and valve covers to within 6 mm (1/4") of the new pavement surface and ensure that grate designs are bicycle-safe; and
- Sweep the project area after overlay.

Vegetation

Vegetation encroaching into bikeways is both a nuisance and a problem. Roadside vegetation that is not a bother to a motorist or pedestrian can be surprise a bicyclist and cause a cyclist to be knocked off their bike or crash. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists, rather than hidden by overgrown shrubs or low-hanging branches, which can also obscure signs.

- Cut back vegetation to prevent encroachment

Signs, Stripes & Legends

New bikeway signs and legends are highly visible, but, over time, signs may fall into disrepair and legends may become hard to see, especially at night. Signs and legends should be kept in a readable condition, including those directed at motorists: pedestrians and bicyclists rely on motorists observing the signs and legends that regulate their movements.

- Inspect signs and legends regularly, including reflectivity at night;
- Replace defective signs as soon as possible; and
- Retrace legends, crosswalks and other pavement markings in the spring; in high-use areas, these may require another paint application in the fall.

Drainage Improvements

New drainage facilities function well, but may sink and deteriorate over time. Catch basins may need to be adjusted or replaced to improve drainage. A bike-safe drainage grate at the proper height improves bicycle safety. At intersections, there should be no drainage problems in crosswalks. All drainage improvements should be made in conjunction with a scheduled resurfacing or reconstruction effort unless special circumstances exist.

- Raise any deficient catch basin grates to be flush with pavement;
- Modify or replace deficient drainage grates with bicycle-safe grates
- Repair or relocate faulty drains at intersections where water backs up into the curb cut or into the crosswalk;

Utility Cuts

Utility cuts can leave a rough surface for cyclists if not back-filled carefully.

- Wherever possible, place cut line in an area that will not interfere with bicycle travel;
- Back fill cuts in bikeways flush with the surface (humps will not get packed down by bicycle traffic);
- Ensure that cuts parallel to bicycle traffic don't leave a ridge or groove in the bicycle wheel track;

Snow Removal

Snow stored on bike lanes and paved shoulders impedes bicycling in winter, however time, space and weather patterns do not always allow for snow removal practices that can provide for the safe operation of motor vehicle, bicycle and pedestrian traffic with the same pass of the plow. A set of primary bicycle and pedestrian routes should be identified where snow removal activities will be applied to bicycle and pedestrian facilities as soon as possible after snowfall. Other areas used for bicycle and pedestrian travel should be cleared later, but as soon as possible after weather patterns warm and bicyclists and pedestrians are again seeking access to the streets. Bike lanes and sidewalks should not be used for storage of large volumes of snow and ice that may remain after most snow has naturally melted and roads are again fully operable for motor vehicles.

- Identify bicycle and pedestrian routes for priority snow removal.
- Institute practices that re-open bicycle and pedestrian travel in response to overall weather patterns.

ON-ROAD BIKEWAY MAINTENANCE SCHEDULE

TASK	FREQUENCY	COMMENTS
Regular Inspection	2 times per year	Includes all on-road bikeways, identify needed repairs of pavement, signs, marking, etc.
Street Sweeping	4 times per year	All streets with bike lanes, extra attention in the fall and spring
Street repairs	As needed	Repair of streets including potholes, cracks or other problems on streets with bikeways
Bike lane snow removal	As needed	Clear snow completely from streets with bike lanes
Debris removal	As needed	Remove debris from on-street bikeways such as gravel, broken glass
Signs	As needed	Repair or replace signs identified during inspections
Markings	As needed, at least every 2 years	Includes all bike lane markings and symbols and crosswalks

APPENDIX F:
Pedestrian Improvement Areas: Methodology and List

Pedestrian Improvement Areas (PIAs) include two types of locations -- *High Use Areas* and *Problem Areas*:

- *High Use Areas* include locations where significant levels of pedestrian traffic are already present, higher levels of use are desired, or due to latent demand analysis, future land uses and projected development, higher levels of pedestrian activity are expected.
- *Problem Areas* include locations where pedestrian crashes are occurring, where street crossings are difficult or dangerous, where poor pedestrian conditions are a deterrent to pedestrian use, or where pedestrian access is desired but is significantly constrained by large roads, a lack of pedestrian accommodations or other barriers.
- Some locations are both *High Use* and *Problem Areas*.

A list of PIAs (see table below) has been identified to assist the County, VDOT, developers and others in prioritizing locations and activities for pedestrian-related improvements. These areas should receive specialized attention with regard to pedestrian accommodations, safety and security. All road and development projects taking place in or near these locations should address pedestrian needs in a comprehensive manner. The following methodology was used to identify these locations for designation as Pedestrian Improvement Areas:

1. The area was identified during public involvement activities undertaken over the course of the planning process. Comments were received from more than 100 persons during activities that included four public workshops/meetings, regular Citizen Advisory Committee meetings, electronic mail submitted via the project website, and public comments gathered by CAC members or County staff.

2. The area was identified by County staff or the consultant team, or emerged from analysis of existing plans reviewed by the consultants and County staff.

3. The following criteria were used to qualify locations with priority pedestrian needs:
   - All Town Centers in incorporated Towns and emerging suburban communities were included; these centers often include pedestrian generators such as libraries, post offices, Main Street districts, Historic resources or districts retail shopping, County or state service centers, schools, cultural attractions, etc.
   - Village Centers and crossroads in rural areas.
   - Areas near public and private schools, colleges or universities.
   - Plans for future rail or bus transit stations.
   - Areas with mixed uses, including housing, commercial retail and/or employment sites.
   - Major shopping or employment areas with particularly poor pedestrian accommodations.

- Areas around park facilities or community recreation centers; including major new or planned facilities.
- Intersections with existing or latent demand, and poor conditions, as determined by consultant field observations.
- Intersections with reported pedestrian crashes and obvious need for pedestrian crossing and safety improvements.
- Existing and planned interchanges, especially along Routes 7, 15, 28 and 50.
- Major crossings of the W&OD Trail.
- High use/poor condition road segments, road segments needing traffic calming, and major bridges needing pedestrian improvements.

For analytical and prioritization purposes, the sixty-six Pedestrian Improvement Areas were assigned to one of four groups or classes:

- Class 1 includes town centers, village centers, commercial centers (shopping/employment areas), school areas, and future transit centers. These PIAs are typically the largest and most complex in nature. Their needs are often many, including any or all of the following: pedestrian safety improvements at one or more intersections, mid-block crossings, linear accommodations such as sidewalks or widened shoulders, installation of missing curb ramps, traffic calming, connector paths, streetscape and beautification improvements, bike parking, and signage, etc. There are 30 PIAs in Class 1.
- Class 2 includes only intersections. This class is limited to locations where intersection and pedestrian crossing safety improvements are primary. These are typically large intersections were crossing distances are long, accommodations are poor or lacking, and the associated roadways have large volumes of high-speed traffic on multi-lane roadways. Linear accommodations such as sidewalks are often needed as well. Class 2 includes 6 PIAs, two of which include two adjacent intersections that need attention.
- Class 3 includes only interchanges. This class is limited to locations where interchanges exist or future interchanges are planned. Most existing interchanges have no or very limited pedestrian accommodations. Interchanges have simplified vehicular movement patterns, but operate at high speeds, with uninterrupted traffic flows facilitated by ramps, slip lanes and merge lanes; making design of bicycle and pedestrian crossing-safety accommodations a unique and significant challenge. Class 3 has 22 PIAs.
- Class 4 is a catch-all class. It includes W&OD Trail/road intersections, high priority road segments with pedestrian safety issues and three Potomac River bridges that need improved bicycle and pedestrian accommodations. Class 4 has 8 PIAs.

The detailed list of PIAs follows.

List of Pedestrian Improvement Areas

No.	Location	Type	Class
1	Harmony Middle School	School Area	1
2	Heritage/Simpson/Evergreen Schools	School Area	1
3	Farmwell Station Middle School	School Area	1
4	St. Louis Village & Banneker School	School Area	1
5	River Bend / Potomac Falls	School Area	1
6	Maple Av N	Commercial Ctr	1
7	Great Falls Plaza	Commercial Ctr	1
8	Sugarland Crossing	Commercial Ctr	1
9	World Com Campus East	Commercial Ctr	1
10	Broad Run Business Ctr	Commercial Ctr	1
11	Hamilton Town Center/Rte 7 Bus	Town Center	1
12	Round Hill Town Center	Town Center	1
13	Middleburg Town Center	Town Center	1
14	Leesburg Town Center	Town Center	1
15	Purcellville Town Center	Town Center	1
16	Hillsboro Town Center	Town Center	1
17	Lovettsville Town Center	Town Center	1
18	Dulles Town Center	Town Center	1
19	Cascades Town Center	Town Center	1
20	Sterling Town Center	Town Center	1
21	Ashburn Village Center	Town Center	1
22	South Riding Town Center	Town Center	1
23	Moorefield Station (Rte 772)	Transit Center	1
24	Rte 606 Transit Station	Transit Center	1
25	Bluemont Village	Village Center	1
26	Lucketts Village	Village Center	1
27	Waterford Village	Village Center	1
28	Aldie Village	Village Center	1
29	Lincoln Village	Village Center	1
30	Philomont Village	Village Center	1
	Class 2		
31	Rte 9 & Clarkes Gap Rd	Intersection	2
32	Rte 15 Bypass & Ed Ferry/Ft Evans Rds	Intersection	2
33	Rte 7 & Campus/Potomac Vw	Intersection	2
34	Rte 7 & Palisade Pkwy	Intersection	2
35	Rte 7 & Countryside	Intersection	2
36	Palisade Pkwy & Potomac View	Intersection	2
	Class 3		
37	Rte 7 & US 15 Bypass	Interchange	3
38	Rte 7 Bypass & King St	Interchange	3
39	Rte 7 & Belmont Rdg Rd	Interchange	3
40	Rte 7 & Lansdowne Blvd	Interchange	3
41	Rte 7 & Ashburn Village Blvd	Interchange	3
42	Rte 7 & Algonkian/Atlantic	Interchange	3
43	Rte 28 & Nokes Rd	Interchange	3
44	Rte 267 & Claiborne Pkwy	Interchange	3
45	Rte 28 & Old Ox Rd	Interchange	3
46	US 50 & S Riding Blvd & 621	Interchange	3
47	US 50 & 609 Pleasant Valley	Interchange	3
48	US 50 & WIllard	Interchange	3
49	US 50 & 607 Loudoun Co Pkwy	Interchange	3

50	US 50 & 659 Gum Spring Rd	Interchange	3
51	US 50 & 659 Relocated	Interchange	3
52	Rte 28 & Sterling Blvd	Interchange	3
53	Rte 28 & Waxpool & Church Rds	Interchange	3
54	Rte 7 & Battlefield Pkwy	Interchange	3
55	Rte 7 & Crosstrail/Rivercreek Pkwy	Interchange	3
56	Rte 7 & LC Pkway	Interchange	3
57	Rte 15 Bypass & Battlefield Pkwy	Interchange	3
58	Sycolin Road & Rte 7 Bypass	Interchange	3
	Class 4		
59	US 340 Bridge & Road Segment	Bridge	4

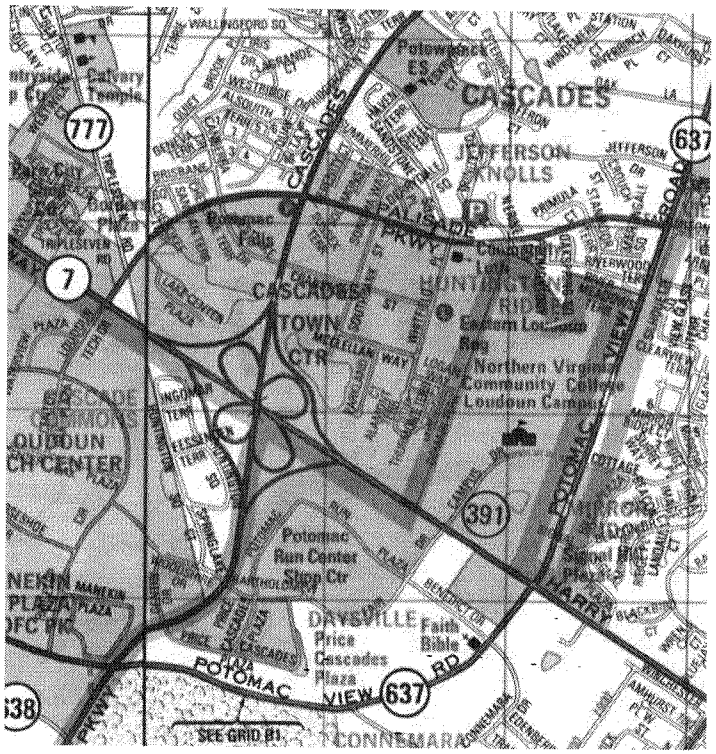
60	Brunswick Bridge	Bridge	4
61	Pt of Rocks Bridge	Bridge	4
62	Planting Field Rd	Road Segment	4
63	Whites Ferry Rd. Access	Road Segment	4
64	W&OD & Ashburn Rd	Trail Crossing	4
65	W&OD & Belmont Rdg Rd	Trail Crossing	4
66	W&OD & Sterling Blvd	Trail Crossing	4

Appendix G:
Case Studies

Cascades Town Center

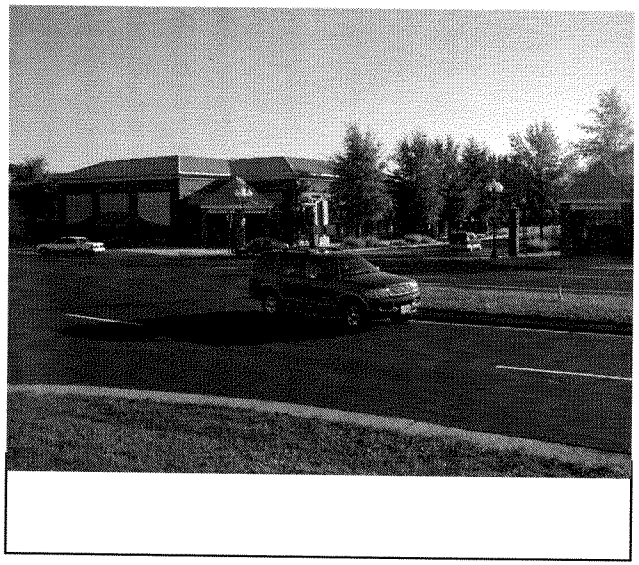
A Suburban Town Center Case Study

Need/Opportunity



Cascades Town Center is a vibrant, walkable shopping and civic center located in the heart of the Cascades & Sterling communities in Eastern Loudoun. Located just north of Route 7 adjacent to the Cascades Parkway, it has good proximity to medium and high-density residential neighborhoods, with thousands of residents living within three-quarters of a mile to the west, north and east of the Center, and hundreds living just across the street in the new Jefferson Knolls and Potomac Lakes subdivisions. However, the Center is bounded by four very wide and high-speed thoroughfares that are difficult for pedestrians to cross and generally isolate the Center from its closest customers. While these parkways have been built with sidewalks and sidepaths along them, key intersections lack crossing accommodations, the walkway network has critical gaps, the bikeway network is insufficient, and bicycle parking is absent from the Town Center itself. The mix of housing, shopping, civic services, and employment in the greater Cascades/Sterling Park/Dulles Town Center area is one of the best opportunities in the whole of Loudoun County to demonstrate how a suburban community can be made bicycle and pedestrian friendly. It is also a great place to demonstrate that if enhancements are implemented, significant numbers of local trips now made by motor vehicles can be shifted to human-powered modes. This case study focuses on intersection and bikeway improvements at the northern gateway to the Town Center (Southbank St. and Palisades Parkway) and along Palisades Parkway. With some strategic bicycle and pedestrian retrofits, Cascades Town Center can become an accessible and popular destination for pedestrians and bicyclists and a center of community life.

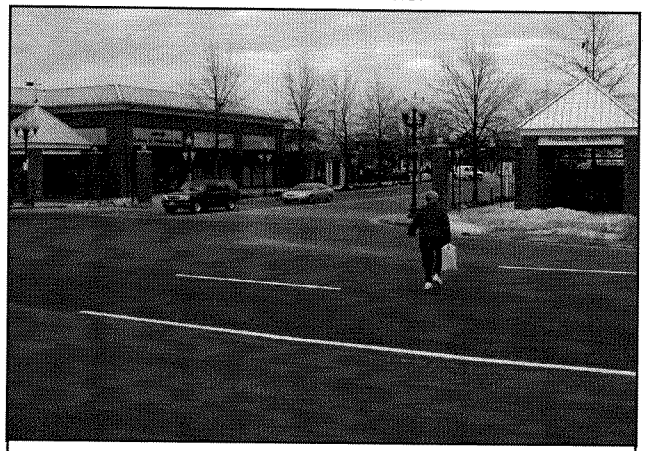
Bicycle & Pedestrian Issues and Context



The Cascades planned community was the recipient of the "Best Overall Site and Land Planning" award in 1994. The whole community and Cascades Town Center are good examples of community-centered design in Loudoun County. The center includes a number of features that are inviting to pedestrians, such as wide sidewalks and store fronts on the street, benches, street trees and flower boxes along the walkways -- a Main Street type setting. However, if you live across the street, you may be as likely to drive to the Staples, the library or lunch at Baja Fresh as walk, because pedestrian accessibility on its periphery is much less attractive than what has been provided in the interior.

Intersection of Southbank Street and Palisades Parkway

The building architecture and visual cues at the corner of Southbank St./Sonoma Way and Palisades Parkway establish this entrance as the primary gateway to the shopping center. Southbank Street leads to the heart of the Center and is opposite Sonoma Way, which provides access into the closest residential neighborhood, Jefferson Knolls. It is a natural pedestrian entry point, and by design, the primary vehicular access as well. However, the intersection is currently un-signalized and is difficult for both drivers and pedestrians to negotiate. There is one crosswalk, across the Southbank Street entrance, but none across Palisades Parkway to the sidewalks and homes on the other side.

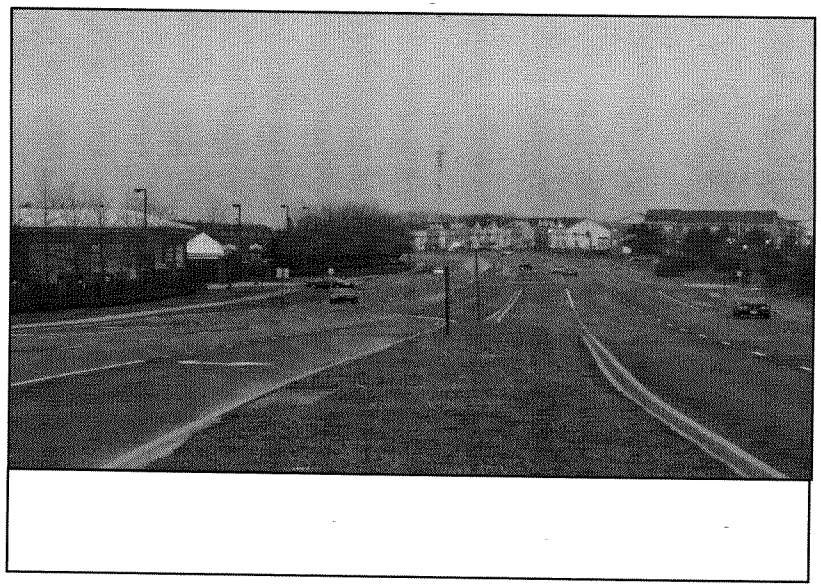


Palisades Parkway is a four-lane divided, minor collector with left and right turning lanes at every intersection including Whitfield Place and Sonoma Way. The median is generally 16-feet, but narrows to 2 feet at Cascades Parkway. The posted speed is 35 mph, however the road was designed and built for 50 mph speeds. The frequency and length of the turning lanes, in addition to the openness of the route, create the feeling that the road is an arterial route and most drivers drive accordingly.

The pedestrian crossing distance of Palisades at Southbank/Sonoma is approximately 115 feet on the west side and 125 on the east side. The 16-foot grass median acts as a protector, and many pedestrians cross one side of the road at a time and wait next to the median-nose for a break in traffic to continue their crossing.

Motorists also have difficulty entering Palisades Parkway from Southbank. The configuration of the intersection and the placement of the stop bar create a number of visual

impediments for the motorists trying to turn onto Palisades, which is the only way to reach Cascades Parkway southbound and Route 7. While the stop bar is appropriately in front of the crosswalk, the crosswalk is pulled back so far from Palisades that cars are drawn into or across the crosswalk to see around them. The large width of Palisades, the crown of the road and the slightly lower elevation of Southbank make it very difficult for left turning vehicles to judge the gap in westbound traffic on Palisades. Moreover, because there is no signal at Southbank, cars on Palisades tend to travel at high speed between the signals at Whitfield Place and Cascades Parkway.

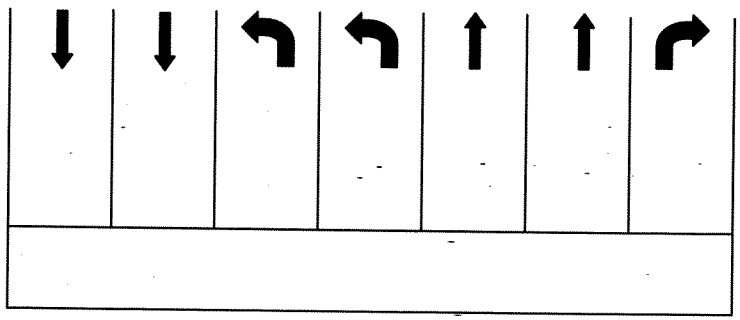


Right turning motorists also have difficulty seeing to get out of Southbank. The vehicles turning left from Southbank (which are many), and vehicles in the right turn lane on Palisades block the view of right turning motorists on Southbank, who are looking left for approaching eastbound traffic. Each of these visual barriers forces motorists to pull further into the intersection to get a clear view of traffic conditions, blocking the existing crosswalk while they wait for a gap in the traffic. But even more importantly, they completely distract motorists from the task of watching for pedestrians. Drivers are pre-disposed to step on the gas and go as soon as a gap in Palisades traffic appears, reducing their ability to avoid hitting a pedestrian in a crosswalk, or bicyclist in the street.

Adjacent Intersections: Palisades & Whitfield Place, Palisades & Cascades Parkway

Whitfield Place provides access to the eastern end of the Town Center as well as the library. Like the Southbank/Palisades crossing, this intersection is very large and is residential on its northern leg. However, Whitfield is signalized, has pedestrian actuators and signalheads, and high visibility crosswalks. The north leg of the intersection has a median planter island with large trees, which emphasizes the fact that the road narrows and changes in character from commercial to residential.

The intersection of Palisades Parkway and Cascades Parkway is also a huge intersection with 125 – 130 foot pedestrian crossing distances across each of its four legs. It provides multiple turning lanes on each leg of the intersection. Coming southbound along the east side of Cascades Parkway, pedestrians must cross seven lanes of Palisades traffic (see cross section at right) to reach the entrance of the Cascades Town Center. The intersection currently does not include accessible ramps at each corner. The mix of turning lanes for each road at this intersection



visually chops up the road and creates a large and inconsistent configuration for automobiles, pedestrians and bicyclists to navigate.

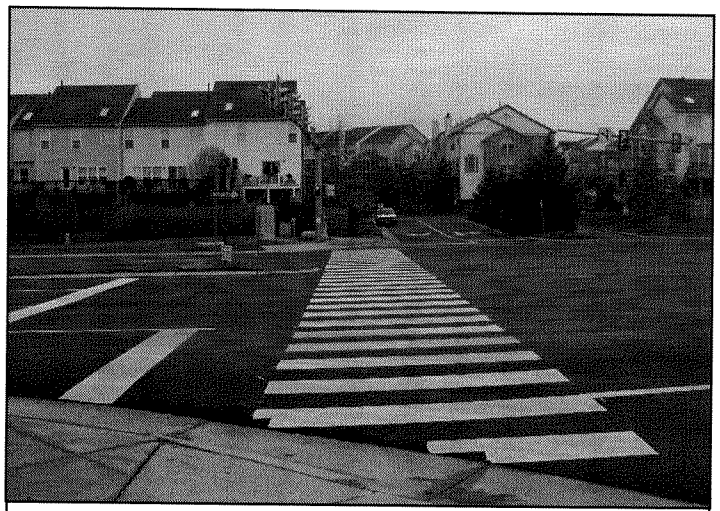
Connections Between Cascades Town Center and Surrounding Community

There is tremendous potential to connect bicyclists and pedestrians from surrounding communities to the Cascades Town Center. Adjacent to the Town Center is the Northern Virginia Community College (NVCC) Loudoun Campus, the Eastern Loudoun Regional Library, a Loudoun County Senior Center, a community church, Potomac Falls Post Office, a Hotel and other shopping centers. During the summer months, the senior center plays host to a vibrant farmers market.

Within a couple of miles of the Town Center are the Loudoun Tech Center, Dulles Town Center, Claude Moore Park, Algonkian Regional Park, Marymount and Old Dominion University campuses and many neighborhoods such as Cascades, Sterling Park, Countryside, Sugarland Run, and Lowe's Island. All that is lacking are a few important linkages. One of the most critical links needed is a safe crossing of Route 7.

There is an existing sidepath along Cascades Parkway between Palisades Parkway and Route 7. It begins in the Cascades neighborhood and continues south of Palisades Parkway to a point just south of Cranston Street. There is the potential to continue it along the Route 7 access ramp to the west, to a point near Lake Center Plaza, where a bicycle and pedestrian bridge could provide an overpass of Route 7 and connection to the Loudoun Tech Center and roads on the south side of Route 7.

Design Recommendations



Southbank/Sonoma/Palisades Intersection

Installation of a traffic signal and crosswalks at Southbank/Sonoma and Palisades Parkway will greatly enhance the pedestrian's ability to safely cross the street and the motorist's ability to safely exit and enter the Town Center. Median noses should be added to the existing medians to extend them across the sidewalk in such a way as to provide fully protected median refuge islands. Attractive plantings and signage can be added to these median areas to enhance the gateway effect of this intersection.

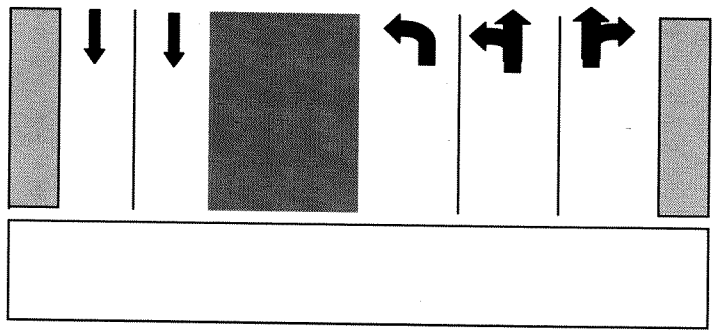
Further improvement should include dropping the right turn lane from Palisades westbound onto Sonoma Way and the left turn lane from Palisades eastbound onto Sonoma Way. These dedicated turn lanes are unwarranted for such a small-scale

residential neighborhood that generates little traffic. The elimination of these turning lanes can reduce the distance required for pedestrians to cross Palisades Parkway by 11-12 feet. This space can help provide the space required to add five-foot bicycle lanes on both sides of Palisades Parkway.

The 85-foot entrance onto Sonoma Way is excessively wide for a small neighborhood street. The wide intersection allows for higher than necessary motorist turning speeds into the development. Recommended enhancements to improve pedestrian crossing at this location are calming of traffic entering the neighborhood to include use of curb extensions, tight curb radii, and a planted median (similar to Whitfield Place).

Palisades Parkway

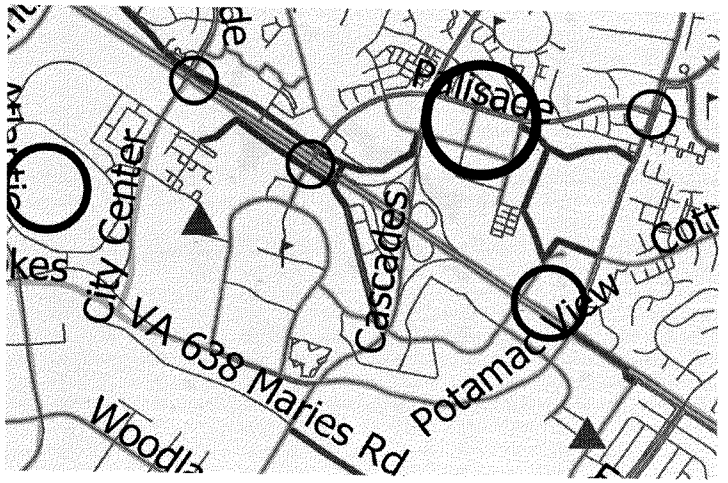
The entire corridor containing Palisades Parkway should be upgraded to promote pedestrian and bicycle uses. In its existing condition, with a wide right of way and existing medians, the corridor has the potential to become an attractive and multi-modal suburban boulevard.



Significant improvements can be executed with minimal changes to the existing curb lines. Lane widths should be reduced to ten feet and short sections of curbs moved back, to allow for installation of bicycle lanes on both sides. Elimination of some turn lanes will allow space to be used for bike lanes or returned to the medians to achieve a consistent look and allow tree planting. The sidewalk on the south side of Palisades should be widened to 6-8 feet, and possibly moved further from the road to add buffer space. The sidepath on the north side of Palisades should be resurfaced in places and realigned to improve utilitarian use. A section of guardrail should be removed. In addition to improving the Southbank/Palisades intersection, the intersection at Palisades and Cascades Parkways can be reconfigured as shown at right, to improve pedestrian crossing at this location.

Improving Connections Between Cascades Town Center and Surrounding Communities

The installation of bike lanes on Palisades Parkway will improve bike access between the Sugarland Run neighborhood and the Town Center. A number of other improvements identified in the Mobility Master Plan will expand linkages all around the Town Center (see list below and purple lines on the map at right).



- With the construction of the pedestrian bridge over Route 7, described earlier, another link can be forged with Claude Moore Park, the Loudoun Tech Center and Dulles Town Center. This link will also become an important north/south link connecting the W&OD Trail with Algonkian Regional Park and the Potomac River. This bridge can connect with a bicycle and pedestrian route along Huntington Square Court and link back to on-street facilities along Cascades Parkway.
- Trails to and around the NOVA Campus and improvements to three intersections will forge links to Sugarland Run neighborhoods and Sterling Park and improve access to the Community College. The intersections are Potomac View & Route 7, Potomac View & Palisades Pkwy., and Campus Dr. & Route 7. There may be the potential to grade separate a part of the Route 7 crossing east of Potomac View by using the wide median of Route 7 and the difference in elevation of the east and west bound lanes. Paving shoulders along Potomac View from Route 7 to Palisades will enhance bicycle access.
- Gaps in the sidewalk/sidepath system should be eliminated at the west end of Riverwood Terrace, along Palisades near Tripleseven Road (see photo), and in other small locations.
- Sidepaths along both sides of Route 7 should be developed between Countryside Blvd. and the proposed bridge over 7 just west of Cascades Parkway. These linkages will extend connectivity to all of the commercial properties that front on Route 7 and to the Dulles Town Center and the residential developments that are mixed into these areas.
- To make the Town Center work for cyclists, bicycle parking needs to be provided within the Center and at other retail and office and civic buildings.

Cost Factors and Estimates

Recommended improvements for this case study site include a wide range of elements. Many could be implemented independently of each other, or in phases. Thus the potential costs of an improvement project at this site would vary greatly depending on the scope of the effort. One intersection improvement project may cost from $150,000 to $200,000, depending on what features were included in the design beyond the addition of traffic signals. Determining the cost of adding bike lanes will require more detailed study. It could vary considerably depending on how many feet of lanes are striped, how many feet of curb line would need adjustment and what the needs would be to re-stripe the travel lanes of the entire roadway. Traffic engineering and analysis costs are not included, nor are the costs of all of the potential improvements listed that can improve the neighborhood connections. The items listed below are intended to provide a range of potential costs related to pedestrian and bicyclist improvements in the study area. Negligible items are below $5/foot.

Cost Factors and Estimates

Signal for a 4-way intersection	**$100,00-150,000 each**
Bicycle Lane Paving	**$10/foot**
Bicycle Lane Striping	**$2/foot**
Bicycle Detector	**$1,000 each**
Road Marking Symbols	**Negligible**
Safety Signage	**Negligible**
Sidewalks	**$30/foot**
Pedestrian Signal Heads & Actuators	**$5,000 each**
Pedestrian Overpass	**$2-6 million**
Bicycle Racks	**Negligible**

Implementation Issues/Opportunities

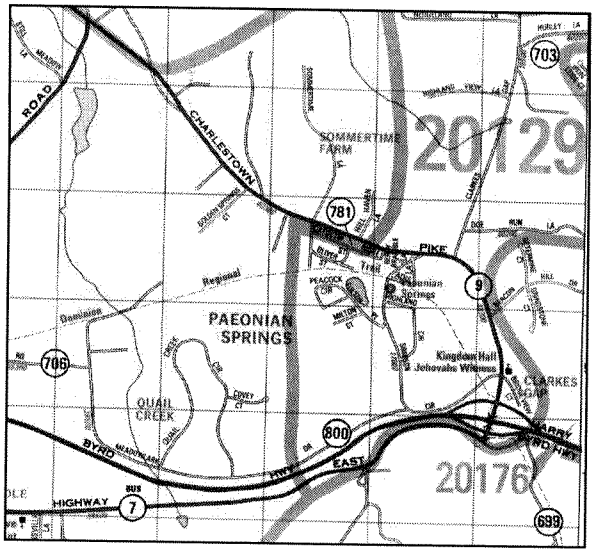
To improve pedestrian and bicyclist safety in the Cascades Town Center Area, it will be necessary for a variety of parties to collaborate together. These include the following:

- Loudoun County Office of Transportation Services;
- Virginia Department of Transportation;
- Edens & Avant (Developers of CTC);
- CTC tenants;
- Loudoun County Bicycle and Pedestrian Citizens Advisory Committee;
- Local residents.

Businesses should be approached immediately to encourage them to participate with the County to install bicycle racks within the Town Center. Neighborhood associations should be engaged to determine individual connectivity needs for each neighborhood. And further traffic analysis should be performed to determine the optimal balance between pedestrian, bicyclists, and motorists needs along Palisades Parkway. Study efforts should focus on signalizing intersections, reducing the turning lanes, and travel lane widths, thereby narrowing the road to increase the effectiveness of the roadway for all users.

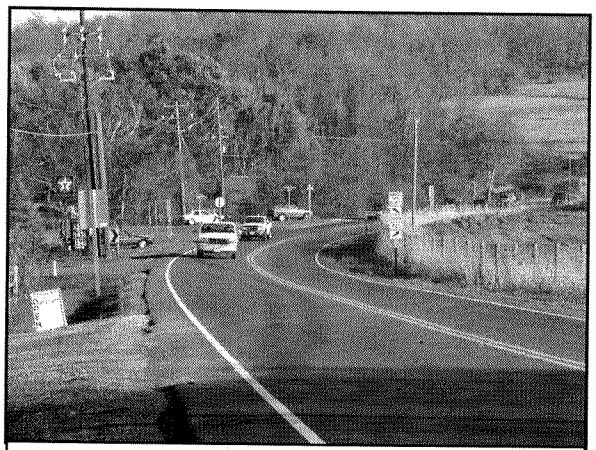
Paeonian Springs: Route 9 & Clarke's Gap Road

A Rural Intersection Case Study



Need/Opportunity

The intersection of Route 9 and Clarke's Gap Road (Route 662) is the primary bicycling gateway between the Washington and Old Dominion (W&OD) Trail and rural routes in the northern part of the County. The Citizens' Advisory Committee for the Plan and numerous public comments identified this location as a primary *hot spot* for bicycle and pedestrian traffic. The combination of high vehicle speeds, turning movements, downhill slopes, limited sight distances and other factors make this intersection difficult for bicyclists and pedestrians to navigate. Because of its proximity to the W&OD Trail, and the generally lower traffic volumes and slower speeds on Clarke's Gap Road, this intersection is unavoidable for bicyclists and pedestrians seeking access to Waterford, Taylorstown and Lovettsville. A number of motor vehicle crashes and two fatalities within the last two years has caused this location to rise to the top of the list of highway safety needs for both the County and Virginia Department of Transportation (VDOT). Thus, it's a prime case study location for the County Bicycle and Pedestrian Mobility Master Plan.

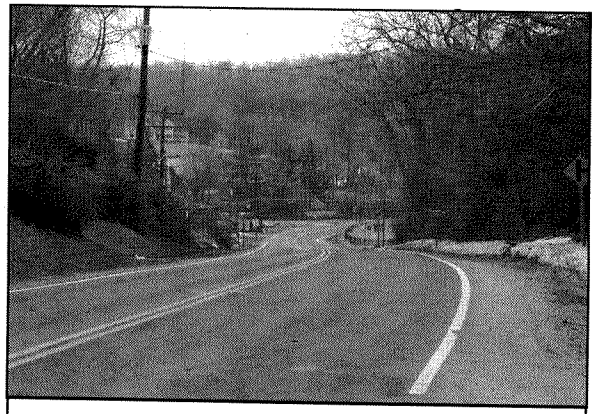


Bicycle & Pedestrian Issues and Context

Route 9 and Clarke's Gap Road provide direct highway access to Leesburg and other points east and south for residents in Hillsboro, Lovettsville and Waterford, and commuters from West Virginia. Motorists from these areas travel along Routes 9 and 662 to and from the interchange with Route 7, which is approximately one-mile south of Paeonian Springs. Bicyclists and pedestrians in the area must use the same roads to access local businesses, residences and the W&OD Trail.

Currently, Route 9, on each side of Route 662 has 11-foot travel lanes and variable 1-2 foot paved shoulders. Route 662 has no shoulders, no center stripe and 10-foot travel lanes. Neither route provides bicycle or pedestrian accommodations. VDOT has assigned an automobile roadway level of service grade of "F" to Route 9. Bicycle level of service along Route 9 is a "D;" and along Route

662 is "E." West of 662, Route 9 pedestrian level of service is "F;" east of 662 it is "E;" and Route 662 is "D."



View looking east along Route 9 towards Clarke's Gap Road intersection

Bicyclists and pedestrians traveling between the W&OD and Route 662 must use Route 9 travel lanes or its narrow shoulders, which vary in width depending on the direction of travel. Bicyclists generally share the road with automobiles, while pedestrians walk along the paved or gravel portions of the shoulder. Upon reaching the T-intersection with Route 662, which is located at the bottom of a hill on a curve, they must cross Route 9 to the left to reach Clarke's Gap Road. This requires vigilance in front and behind, looking out for vehicles making the high-speed curve through the intersection or coming out of Clarke's Gap Road.

Roadway navigation is complicated by the presence of several destinations for motorists, pedestrians, and cyclist at or near the intersection. Adjacent to the intersection is a gas station and mini-mart that has multiple driveways configured with wide turning radii for high-speed access into and out of the station. West of the gas station, along Route 9, are additional driveways for local business and homeowners. Due to the poor sight distances, and high traffic speeds, motorists must make quick decisions to enter or exit the roadway environment at these destination points, which reduces their ability to notice pedestrians or bicyclists in the roadway.

Bicycle Level of Service Existing Conditions

Route Name	From	To	Lanes: Thru #	Lanes: U/D	Traffic Vol. Exist. ADT	Post Spd. mph	Width of Pavement: W_t	Width of Pavement: W_l	Width of Pavement: W_m	Pvmt Cond. (5..1)	Level of Service: Bike (A..F)	Level of Service: Ped (A..F)
Route 9	Route 7	Route 662	2	U	14,000	40	13	0	0-8	4	D	E
Route 9	Route 662	Route 704	2	U	14,000	40	12	0	0	4	D	F
Route 662	Route 704	Route 9	2	U	3,050	45	10	0	0	5	E	D

There are presently no warning signs to alert motorists to the potential for pedestrian or bicycle activity in the roadway. Due to the short sight distances created by the existing vertical and horizontal curves, motorists can be caught by surprise when they approach pedestrians and/or cyclist in or near the travel way. There are also no signs to provide direction to the W&OD trail for bicyclists and pedestrians along Clarke's Gap Road or Route 9. These field observations and level of service analyses confirm what daily commuters and local trail users know too well, that this intersection is dangerous and uncomfortable for users of all modes.

Detailed Conditions

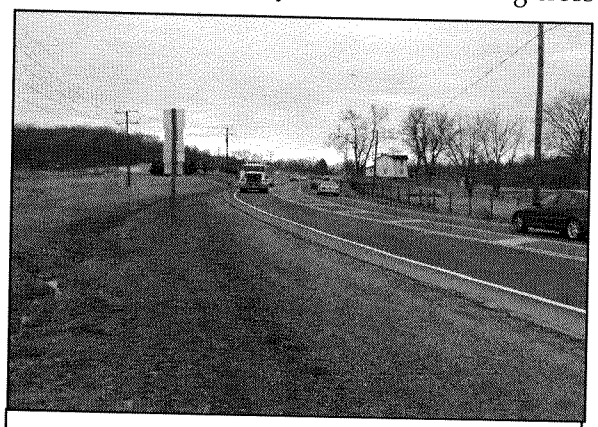
Route 9 – West of Route 662:

VDOT has assigned a motorists level of service grade of "F" to this portion of Route 9. The roadway configuration generally follows the existing cross section shown:

Existing Cross Section

0'-2'	11'	11'	0'-2'
Shldr	Travel	Travel	Shldr

The dimensions display the pavement width for each component of the road. The shoulders generally drop off steeply, and are gravel or dirt.



Corridor Two - View looking east along Route 9 towards Route 7 intersection

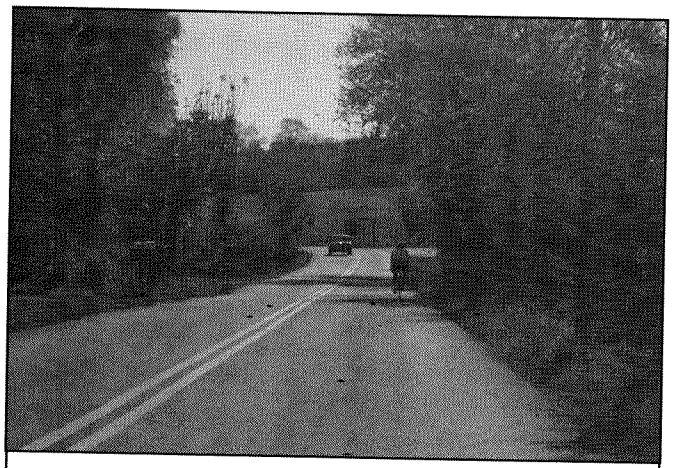
Route 9 – East of Route 662:

VDOT has assigned a motorists level of service grade of "F" to this portion of Route 9. The roadway configuration generally follows the existing cross section shown:

Existing Cross Section

1'-2'	11'	0'-5'	11'	1'-2'
Shldr	Travel	Median	Travel	Shldr

The dimensions display the pavement width for each component of the road. The shoulders generally drop off gradually, and are gravel or dirt. The median starts near the intersection with Beacon Hill Drive and ends close to the intersection with Clarkes Gap Road.

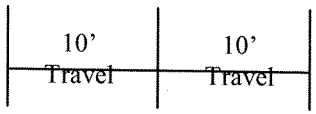


Corridor Two - View looking south on Route 662 towards Route 9

Route 662 – North of Route 9:

VDOT has assigned a motorists level of service grade of "F" to this portion of Route 9. The roadway configuration generally follows the existing cross section shown below:

Existing Cross Section



There are no shoulders present on this roadway. The edge of the road varies, but generally is overgrown with vegetation.

VDOT Design Parameters for Route 9/662 Traffic Safety Project

Route 9	Route 662
• Design for 50 mph • Asphalt Concrete Surface • Lane width: 12 feet • Graded shoulders: 13 feet (8 feet paved) • Ditch width: 6 feet • Turn lane in each direction • No sidewalks • No bicycle paths • One traffic light • No change in vertical alignment of roadway • Minor horizontal adjustment of roadway to accommodate turn lane	• Design for 50 mph • Asphalt Concrete Surface • Lane width: 12 feet • Graded shoulders: 6 feet (not paved) • Ditch width: 4 feet • Turn lane for each direction • No sidewalks • No bicycle paths • No change in vertical alignment of roadway • Minor horizontal adjustment of roadway to accommodate turn lane

Existing VDOT Road Reconstruction Project

Because of the traffic safety issues noted earlier, the Virginia Department of Transportation (VDOT) has begun a formal study of this intersection in preparation for implementing significant traffic safety improvements. VDOT is currently in the preliminary field inspection stage of the design process. The current project scope does not include provision of pedestrian or bicycle related accommodations on the road. VDOT is encouraged to revise this requirement to comply with the July 2001 Revised Countywide Transportation Plan (CTP). CTP policy requires that roadway improvements being considered for this area accommodate bicycle and pedestrian user needs. VDOT's project at this location presents an immediate opportunity to implement bicycle and pedestrian improvements outlined in this Bicycle and Pedestrian Mobility Master Plan.

The CTP classifies Route 9 as a rural minor arterial, with a planned ultimate condition that includes two 12-foot travel lanes and 8-foot paved shoulders. The CTP classifies Route 662 as a major collector with a planned ultimate design that includes two 12-foot travel lanes and 6-foot graded shoulders. Both routes are designated for bicycle accommodations in the CTP.

VDOT Project Timetable	
Milestone	Completion Date
Scoping	1/31/02
Survey	10/12/02
Preliminary Field Inspection	09/30/03
Public Hearing	09/30/03
CTB Approval	02/20/04
Field Inspection	07/30/04
Right-of-Way	08/30/04
Complete Road and Bridge Plans	09/19/04
Advertisement	09/13/05

Current VDOT Project Status

It is important that Loudoun County coordinate with VDOT to integrate bicycle and pedestrian improvements into the construction documents for this corridor per the adopted CTP and the proposed Bicycle and Pedestrian Mobility Master Plan. There will be a minimal cost increase to work with VDOT now to increase the scope of work for the project, as compared to an effort to retrofit the roadway once the planning and re-construction is complete. VDOT's existing scope of work states that they design the roads for the conditions listed in the table to the right. Given the project timetable (see previous page), there is sufficient time to make changes to the existing project scope and budget.

Design Recommendations

Bicycle and Pedestrian Improvement Recommendations:

Below are recommendations for providing bicycle and pedestrian accommodations along each roadway. They were developed on the assumption that a new traffic signal will be installed as a part of the intersection improvements. These recommendations should be given serious consideration in the scoping, planning and design phases of the project, and construction should result in improved safety and conditions for bicyclists and pedestrians.

Reduce Vehicle Speeds

Both the existing and proposed design and operating traffic speeds are too high for safe pedestrian and bicycle travel along this corridor, especially given current and proposed sight distances, traffic volumes and driveway frequencies, and the future installation of a traffic light.

- Narrow the travel lane widths to 10 feet between Simpson Circle and Beacon Hill Drive;
- Provide tight curb radii at existing commercial driveways;
- Eliminate one of the Route 9 gas station driveways or try to reconfigure them;
- Plant trees along portion of Route 9 between Route 7 and Route 662 to reduce the "wide open" feeling of this portion of the road;
- Consider converting the striped median on Route 9 to a vegetated 6-8 foot median with trees, and carrying it through the crosswalk at the intersection. Consider a 2-3 foot concrete median in the western leg of the intersection from Clarke's Gap to Simpson Circle.
- Provide signage warning motorists of pedestrians and bicyclists in the area;
- Provide flashing yellow beacons prior to the signal to warn motorists when the signal is red or turning red.
- Install traffic calming devices in the vicinity of Simpson Circle eastbound, and Beacon Hill Drive westbound to both warn and slow motorists (i.e.-rumble strips).

Provide Pedestrian Accommodations

- Provide crosswalks with, bicycle/pedestrian activators, at new signalized T-intersection:
  a) across Route 662 and both right turn slip lanes if provided;
  b) across each leg of Route 9;
  c) if slip lanes are provided for right turns onto and out of Clarke's Gap Rd., use "pork chop" islands and crosswalks across the slip lanes;
- Provide 8'sidepath along the south side of Route 9 between Clarke's Gap Rd and Simpson Circle (consider extending a 6' sidewalk to Sommertime Lane);
- Provide 4'-6'paved shoulder along the north side of Route 9 between Clarke's Gap Rd and Simpson Circle;
- Provide signage indicating W&OD trail access route;
- Provide a 5-foot graded, gravel pedestrian path as a part of the shoulder and/or roadside buffer on the north side of Route 9 east from 662 to Bridge View Ct.

Existing Conditions			**Lanes**		**Traffic Vol.**	**Post Spd.**	**Width of Pavement**			**Pvmt Cond.**	**Level of Service**	
Route Name	**From**	**To**	**Thru #**	**U/D**	**AADT**	**mph**	**W_t**	**W_l**	**W_m**	**(5..1)**	**Bike (A..F)**	**Ped (A..F)**
Route 9	Route 7	Route 662	2	U	14,000	40	13	2.5	0-8	4	D	E
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	40	17	5	0	5	B	C
Route 9	Route 662	Route 704	2	U	14,000	40	11	0	0	4	D	F
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	40	16	5	0	5	C	C
Add 5' Bike Lane, Add 5' Sidewalk-No Buffer			2	U	24,000	35	16	5	0	5	B	C
Route 662	Route 704	Route 9	2	U	2,300	45	10	0	0	5	E	D

Provide Bicyclists Accommodations

- Provide 5 foot bicycle lanes on both sides of Route 9 between Route 7 and Clarke' Gap Road;
- Provide bicycle loop detector in the left turn lane of Clarke's Gap Road for the movement: Route 662 southbound to Route 9 eastbound;
- Provide signage indicating W&OD trail access route;
- Provide lane striping along Route 662 to help guide motorists and bicyclists through the intersection. This will help define the narrow shared use corridor along Route 662 when the roadway narrows back to its typical 20 foot width.

Current and Future Bicycle Level of Service Conditions

With the implementation of five-foot bike lanes on either side of Route 9 and the installation of an 8-foot sidepath along Route 9, the bicycle and pedestrian levels of service can be increased as demonstrated in the table below. Given the expected increase in average daily traffic along this corridor by 2026, it will be helpful to reduce the speed of traffic through this intersection. As is demonstrated along the narrower portion of Route 9, the reduction in speed by 5 mph, can improve the level of service for bicyclists sharing the road with motorists. This level of service model can only be applied to the non-intersection portions of the road. Calculations for Route 662 were not performed due to the small portion of the road being re-constructed as part of the VDOT project.

Cost Factors and Estimates

The most expensive portions of the project are already funded for the roadway improvement. These items include the land acquisition, traffic signal, and re-surfacing. The items listed below are relatively inexpensive in comparison to the existing project's budget. Negligible items are below $5/foot.

Cost Factors	Estimates
Land Acquisition	**$25k – $40k per acre**
Bicycle Lane Paving	**Negligible**
Bicycle Lane Striping	**Negligible**
Bicycle Detector	**$1,000 each**
Road Marking Symbols	**Negligible**
Safety Signage	**Negligible**
Sidewalks	**$30/foot**
Pedestrian Signal	**$5,000 each**
Rumble Strips	**Negligible**
W&OD Signage	**Negligible**

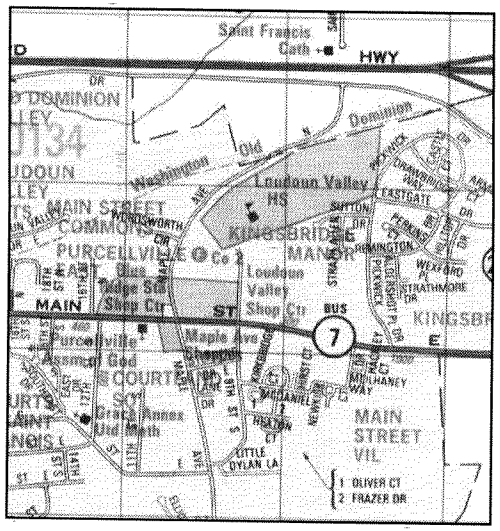
Implementation Issues/Opportunities

To improve pedestrian and bicyclists safety, it may be necessary for the Loudoun County Board of Supervisors to amend their existing contract with VDOT to require the installation of any pedestrian or bicycle related facilities. It is sufficiently early in the planning process to modify the current intersection and roadway improvement plan. It will be necessary to also engage the following constituencies of any proposed changes: the Loudoun County Bicycle and Pedestrian Citizens Advisory Committee, W&OD Trails users, W&OD officials, adjacent property owners and local residents.

Maple Avenue Corridor - Purcellville

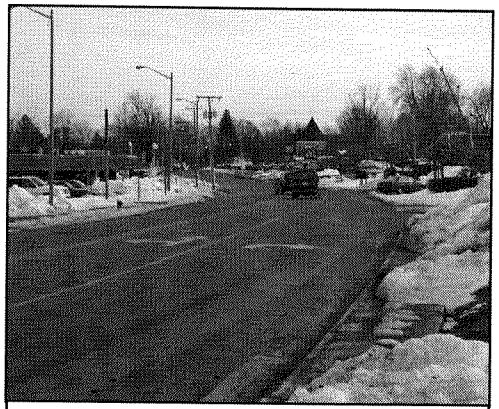
A Small Town Case Study

Need/Opportunity



Maple Avenue N. in Purcellville is a short but active thoroughfare. It provides local access to and from the W&OD Trail, Loudoun Valley High School and a number of major shopping centers. Bicycle and pedestrian issues along this road are many, and typical of collector roads in the smaller Loudoun communities. There are significant gaps in the sidewalk system, missing curb cuts at intersections, few opportunities for pedestrian crossings, no bicycle facilities, irregular vehicle lane striping patterns and frequent and poorly defined driveways. It is currently very difficult for students and others to walk on the east side of the street from the school because the sidewalk ends at the Fire Station. Crossing Main Street (Business Rte. 7) at Maple is difficult and dangerous. Between Main Street and the W&OD Trail, a distance of a half-mile, there are no marked crossings for pedestrians, yet there are many destinations on the opposite side of the street. Even for motorists, navigating the road is a little unsettling because the lane striping varies every few hundred feet and there are many high use driveways with cars entering and exiting the road in all directions. As with many locations within the County, improvements made to increase bicyclist and pedestrian safety and access can also improve safety and access for motorists.

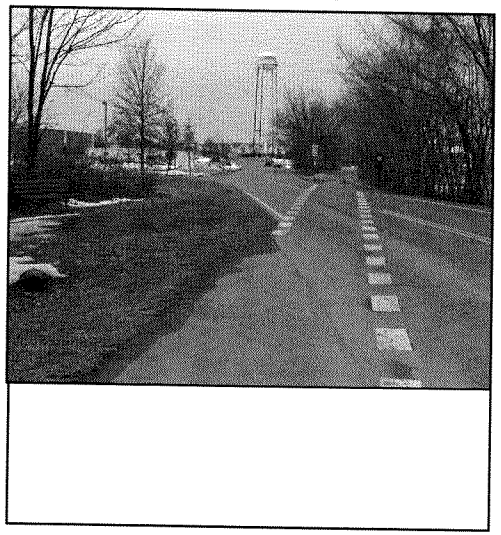
Bicycle & Pedestrian Issues and Context



Maple Avenue North Corridor

The Maple Avenue corridor under review is bounded by the W&OD Trail to the north and Main Street to the south. The road is contained within the limits of the Town of Purcellville. Maple Avenue is a complex mixture of lanes. The road is essentially a two-lane, undivided road; however, there are multiple left and right turn lanes available to users along the route. Adding to the irregular lane configurations and closely spaced driveways near the shopping centers is the presence of an additional northbound lane located only in front of the school. The road varies in width from twenty-eight feet to forty-two feet. The posted speed limit is 30 mph.

Sidewalks are intermittent along Maple Avenue. There is some sidewalk on the west side of the street linking the commercial shopping area and an apartment complex, however it does not continue north of Wordsworth Circle to the school, nor does it reach to the Bus. Route 7/Maple Avenue intersection at the southern end of the corridor. The sidewalk on the east side of the street only links the fire station and the high school, stopping short of the commercial shopping area near Business Route 7. One of only two striped crosswalks on the entire street is at the W&OD Trail. Currently, pedestrians walk on driveways, sloped gravel shoulders, grass buffers and in parking lots to get between the disconnected segments of sidewalk or to reach an appropriate place to cross the street. Pedestrians must wait for a gap in traffic and make a run for it.

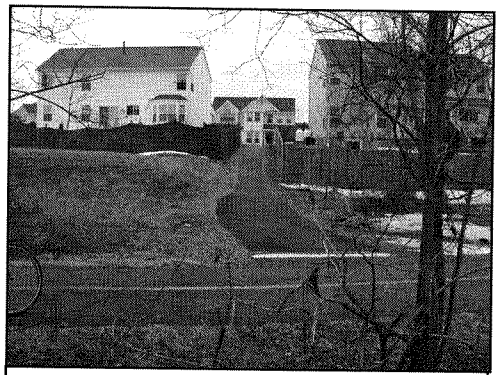


The Washington and Old Dominion Trail

The W&OD Trail currently terminates in Purcellville about one mile west of Maple Avenue near the city center. However, the town's largest shopping centers and a number of restaurants are located at the intersection of Maple and Main (Business Rte. 7), so Maple Avenue provides the most direct access to the newer shopping areas for W&OD Trail users. Moreover, for many Purcellville residents who live in the southeast quadrant of the Town, Maple Avenue is the only street that provides access to the W&OD Trail for recreational or commuter trips. For residents in the northeast quadrant of the Town, such as the Kingsbridge neighborhood, formal and informal trail connections are provided just east of Loudoun Valley High School.

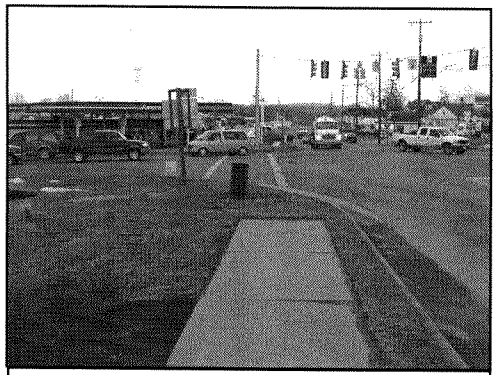
Loudoun Valley High School

Loudoun Valley High School is located on the northern end of the corridor adjacent to the W&OD Trail. The high school provides parking for students who drive to school but it does not provide bicycle parking on school grounds. Despite the fact that the W&OD Trail passes within fifty feet of a school driveway adjacent to the school athletic fields, no formal connection is provided to the trail. Sidewalks are located in front of the school with connections that lead to the school buildings. Not all of the connections are ADA compliant. The sidewalk in front of the school was built south along Maple Avenue up to the fire station at which point it ends. Just beyond the fire station is the commercial center located at the intersection of Main Street. With the presence of coffee shops, fast food restaurants, banks, and other commercial stores, this area is a natural destination for students of the high school, and many others who use the corridor. Both the trail and the school generate trips to the two commercial shopping centers that anchor the southern end of Maple Avenue North at Business Route 7.



Maple Avenue/Main Street Intersection

The Virginia Department of Transportation (VDOT) owns Main Street and the associated traffic signal at the intersection with Maple; the Town of Purcellville owns Maple Avenue. The intersection, as designed, allows motorists to turn right on red. A crosswalk traverses Maple Avenue (shown in photo at right), but the sidewalks do not reach the intersection and there are no curb cuts provided along any portions of the intersection for wheelchair ramps. Additionally, signal posts, signal standards, power poles and other appurtenances will complicate future installation of sidewalks and ADA ramps at each corner.

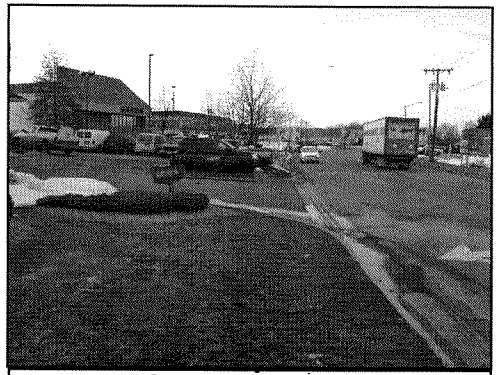


Complicating the movement of pedestrians, motorists, and bicyclists, is the presence of a McDonalds restaurant with a drive thru, a drive-thru bank, and a gas station. Each of these driveways is located within a few hundred feet of the intersection in addition to the driveways for the shopping center.

Design Recommendations

Improve Pedestrian Accommodations Along Maple Avenue

This corridor has a tremendous need for pedestrian accommodations. Finishing the network of sidewalks along Maple Avenue will encourage increased pedestrian activity and provide a safer experience for them. The sidewalk network should be extended along both sides of Maple Avenue to Main Street to direct pedestrians to a safe crossing at the signalized intersection. Crosswalks should be provided to carry the sidewalks across each driveway cut.



The intersection should provide fully for pedestrian crossing across each leg. This would include pedestrian actuated signals and signal heads and adjustments to the signal phase timing to allow pedestrians sufficient time to cross. Wheelchair ramps should be added at each intersection (eight total) to accommodate people with disabilities. Right turn restrictions should be created and enforced when pedestrians are present at the intersection. The curb radii on the northwest corner can be tightened to slow right turning vehicles and make pedestrians waiting on this corner more visible.

One or two mid-block crossings should be considered between Main Street and the W&OD Trail. Near the fire station may be a good location for one of these new crossings, to connect the two shopping centers. Using a raised speed table crosswalk may be a useful crosswalk design to consider.

Re-Stripe Maple Avenue and Add Bicycle Lanes

Five-foot bicycle lanes can be accommodated along Maple Avenue between the W&OD Trail and Main Street. The addition of the bicycle lanes can be accommodated by eliminating the extra lane at the high school, and by eliminating the turn lanes for the commercial center and the residential complex. Should a traffic analysis study conclude that two northbound lanes must be retained in front of the school, a number of other options could be considered:

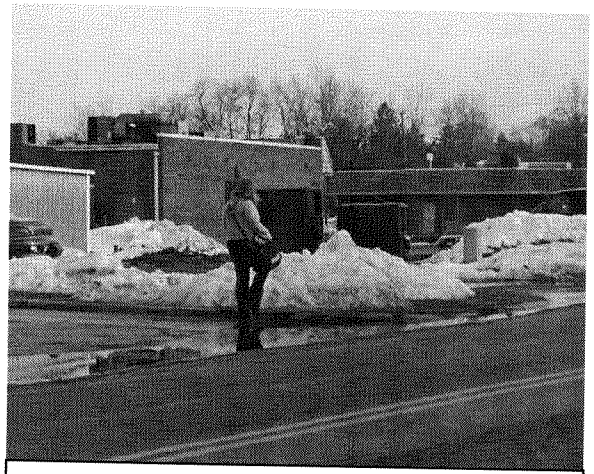
a) the northbound bike lane can be signed as a shared bicycle/automobile lane;

b) the northbound bike lane can be connected to the sidewalk just north of the Fire Station, and the sidewalk widened, to provide an off-road bikeway for students to continue at least to the High School, or

c) the shoulders can be widened and paved for the bike lane to be added to this section of the road.

Comprehensive Traffic and Pedestrian Management for Maple Avenue and Commercial Shopping Centers

The presence of the turning lanes provides expectations to drivers that delays will be minimized along the route. This is not possible due to the preponderance of driveways located along the corridor. The gas station, bank, and McDonalds all provide drive thru service that is accessed from Maple Avenue. The driveways are wide and located close to each other and to the intersection with Main Street.



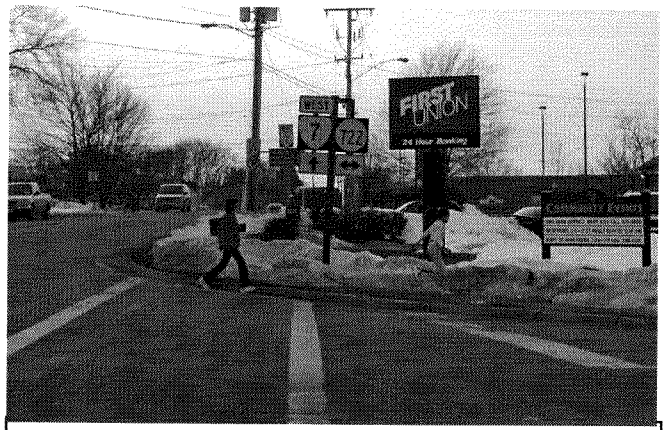
These driveways decrease the efficiency of the intersection and the roadway. The closeness of the driveways creates competition for available road space, and causes conflicts with pedestrians and cyclists who must navigate crossing them.

It is recommended that a comprehensive plan be developed to reduce the frequency of driveways along the route and to improve traffic flow and pedestrian flow through the commercial areas. Sharing of driveways between the businesses can reduce the conflicts for motorists and pedestrians. Crosswalks should be installed at the mouths of each driveway as improvements are made. As part of a comprehensive plan for improving pedestrian and traffic flow along Maple Avenue, the flows at each commercial shopping center should be addressed as well, to provide a safer environment for all user groups. Improvements in this regard can include sidewalk connections across internal drives and parking lots to link the sidewalks on Maple Avenue with the walkways along the shopping center storefronts.

Cost Factors and Estimates

The items are listed to provide ballpark estimates for potential project improvements. It will be necessary to complete a more comprehensive engineering analysis of the corridor before proceeding ahead with any recommendations. These items are shown to provide a general sense of the costs to provide various pedestrian and bicyclist improvements along the corridor. It is not intended to be a conclusive cost estimate. Negligible items generally cost less than five-dollars a foot for installation.

New Crosswalks	**$5,000 each**
Bicycle Lane Striping	**Negligible**
Bicycle Detector	**$1,000 each**
Road Marking Symbols	**Negligible**
Safety Signage	**Negligible**
Sidewalks	**$30/foot**
Pedestrian Signal	**$5,000 each**
Rumble Strips	**Negligible**
W&OD Signage	**Negligible**

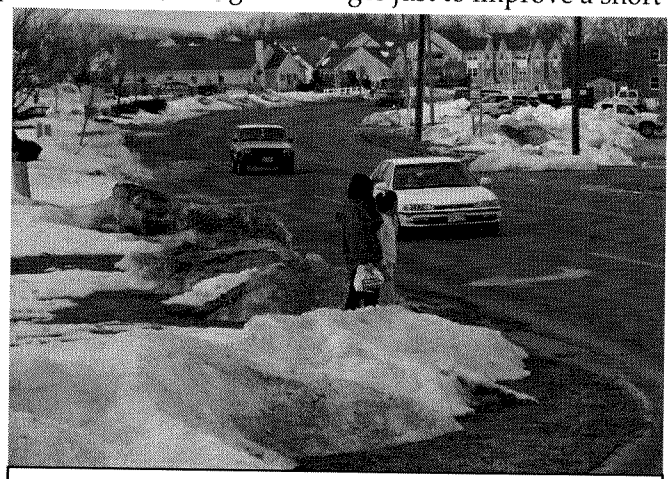


Implementation Issues/Opportunities

To improve pedestrian and bicyclist safety, it will be necessary for the County to work with the Town of Purcellville, the existing businesses, school administrators, and residents to establish clear improvement goals and requirements. It will be necessary to work with VDOT to determine final crosswalk locations, lane configurations, and light timing sequences at the Main Street/Maple Avenue intersection. A traffic corridor study should be performed along the Maple Avenue corridor to determine the feasibility of reducing driveways, reducing lanes, changing lane widths, adding bicycle lanes, and providing additional pedestrian crosswalks and sidewalks.

Currently VDOT, in conjunction with the Town of Purcellville, is conducting an analysis of the signal light timing. Adjustments have been made to the existing signal timing to try to improve the intersection efficiency during school commuting hours. If it is determined that additional signals are required at the intersection, a complete intersection upgrade may need to be performed. This upgrade would require the purchase of additional right-of-way to accommodate signal poles. If this scenario occurs, it will be an opportune time to address the bicycle and pedestrian shortcomings at the intersection.

The Town of Purcellville may be typical in regard to the issues that smaller Loudoun communities face to create pedestrian- and bicycle-friendly intersections and roads. Small towns with smaller tax bases, and jurisdictional road ownership issues can face large challenges just to improve a short street segment. However, small towns are also likely to have a core of dedicated citizen and elected leaders for whom Town pride and economic considerations are a driving force...and where there is a will, there is often a way.

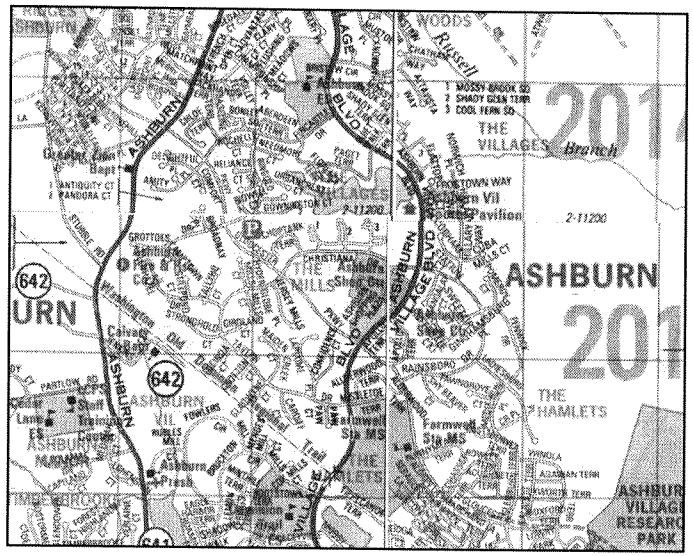


Farmwell Station Middle School

A School Access Case Study

Need/Opportunity

Farmwell Station Middle School is located in Ashburn in the Eastern portion of Loudoun County. The school's central location to residential development and the Washington and Old Dominion Trail (W&OD) is ideal for promoting a walk and bike to school program that can reduce busing needs and improve health for the students. The children who live on the east side of Gloucester Parkway currently walk to the school with assistance from a crossing guard at the intersection with Rainsboro Drive. Unfortunately, once the Gloucester Parkway extension is completed, thereby increasing automobile traffic, the Sheriff's Office will no longer provide a crossing guard for the parkway. Once the crossing guard is removed, the school will begin to bus the children from neighborhoods across the street. With the installation of a traffic signal at the school and with the implementation of a safe walk and bike to school program, Farmwell Station Middle School can increase the numbers of students walking and bicycling to school instead of reducing them.



Bicycle & Pedestrian Accommodation Issues and Context

The Broad Run District of the Loudoun Board of Supervisors receives frequent reports of frustration from residents who are having difficulty crossing Gloucester Parkway and Ashburn Village Boulevard to reach various destinations. New home construction and rising traffic volumes in the immediate neighborhoods surrounding the school have led to a heightened awareness of the need to provide safe and accessible pedestrian and bicycle facilities on Gloucester Parkway and Ashburn Village Boulevard.

In addition to the great potential for increasing student walk/bike trips to school, the school facilities themselves (playground, fields, and classrooms) are a great destination for the entire community. The surrounding neighborhoods are being built with extensive networks of sidewalks on both sides of the street leading up to Gloucester Parkway and Ashburn Village Boulevard; all that remains is to improve the connections across the parkway and boulevard.

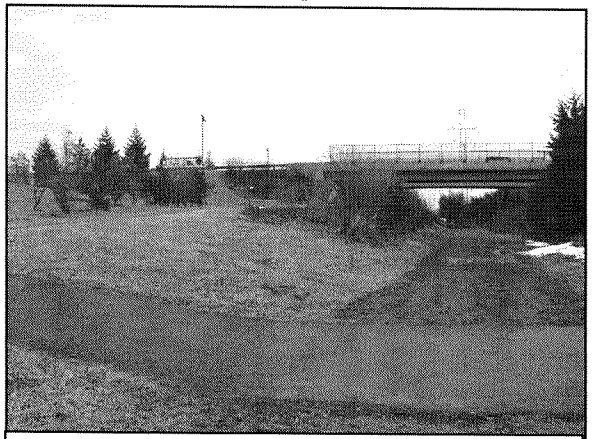
Farmwell Station Middle School

The school is located next to the W&OD Trail, and is adjacent to medium-density neighborhoods that are contained within the walk zone surrounding the school. Currently children who live within the 0.8-mile walk zone, and who live on the eastern side of Ashburn Village Boulevard, walk to school. Students living in neighborhoods north and west of Ashburn Village Boulevard are bussed to school.

Entrance to Farmwell Station Middle School at Gloucester Parkway and Runnymeade Terrace

The Sheriff's Office provides a crossing guard at the intersection of Gloucester Parkway and Rainsboro Drive to facilitate crossing of children across Gloucester Parkway. It is generally school policy to not place crossing guards on roads that are four lanes or larger, and do not have crosswalks or signalization. An exception has been made for this intersection because the average daily traffic on Gloucester is less than 1,500 cars/day. This location will not be as convenient for students to cross who live immediately across and south of the school once the development is finished. Once traffic increases on Gloucester Parkway, the crossing guard will be eliminated at Rainsboro Drive and students will be bussed to the school from the neighborhood across Gloucester Parkway.

In addition to student trips to and from school, the school property itself is a destination that dog walkers, residents, and children use because it contains a large athletic field for recreational activity. The school does not provide any bicycles racks for students or recreational users of the fields.



W&OD underpass looking east towards Farmwell Station Middle School

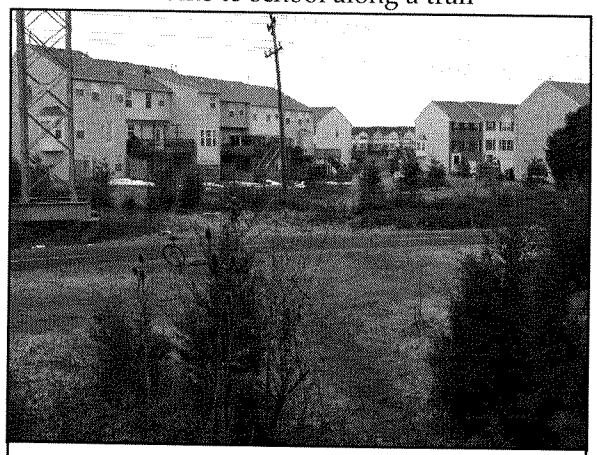
W&OD Trail Access and Security

The W&OD Trail is located along the western boundary of the school property and it provides excellent connections into adjacent neighborhoods that are contained within the 0.8-mile safe walk zone surrounding the school. The trail provides a grade separated crossing of Ashburn Village Boulevard via an underpass that provides a direct connection to the Dominion Trail Elementary School and to the Mills neighborhood north and west of Ashburn Village Boulevard.

There are community concerns about security on the W&OD trail in the vicinity of the school. A number of community meetings were held upon the opening of the school where the residents discussed security concerns with school officials and law enforcement officers. The community decided that it was not desirable to allow students to utilize the underpass to cross beneath

Ashburn Village Boulevard from the Mills neighborhood west and north of the school. Students who live on the north and west side of the underpass are now bussed to school. This policy has removed a large segment of the student body from being able to walk or bike to school along a trail separated from automobiles.

In addition to concerns about security on the trail, a lack of formal linkages between the trail and the neighborhoods has resulted in people creating their own "goat paths", which are often narrow and overgrown with brush. These informal trails end up creating a feeling of insecurity that can be eliminated if they are transformed into official access points to the W&OD. The existence of "goat paths" demonstrates a desire by residents in the community to have direct links to the W&OD Trail.



Existing narrow dirt path ("goat path") leading from W&OD into neighborhood.

Gloucester Parkway

The school is bounded by Gloucester Parkway to the east, which carries approximately 1,000 cars/day. The neighborhoods on either side of the road are residential, consisting of high-density townhouse and apartment style development. Housing continues to be constructed along the parkway. Future plans call for the extension of Gloucester Parkway to the Dulles Town Center. As development and the parkway construction extend east, traffic will increase making it more difficult for residents to cross Gloucester.

Crosswalks and signals are not provided in front of the school at Runnymeade Terrace or at nearby Rainsboro Drive. The closest crosswalk is located at the intersection of Ashburn Village Boulevard.

Typical Cross Section – Gloucester Parkway

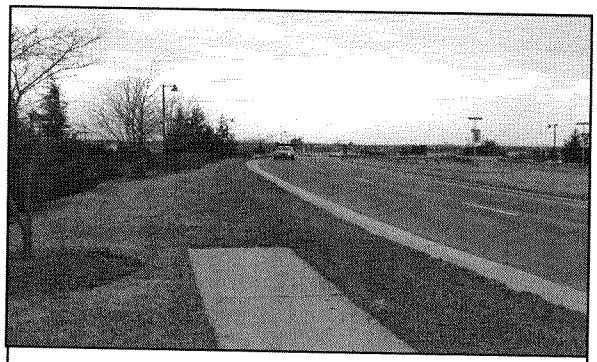
5'	6'	11'	11'	11'	20'	11'	11'	11'	6'	5'
Walk	Buffer	Shldr	Travel	Travel	Median	Travel	Travel	Shldr	Buffer	Walk

- Posted Speed = 35mph
- Four Lanes – Divided
- No Bicycle Lanes
- Sidewalks throughout
- Wide Median
- Right and Left Turn Lanes
- 120' Right of Way

Currently, there are no plans for the installation of crosswalks, signals, or bicycle lanes along this route or at the school entrance. Additionally, there are no existing pedestrian or bicycle warning signs along the road with the exception of school zone flashing warning beacons.

Ashburn Village Boulevard

The school is bounded by Ashburn Village Boulevard to the north and west. This boulevard is classified in the Loudoun County Transportation Plan (CTP) as a major collector road. Currently Ashburn Village Boulevard conveys approximately 14,000 cars/day. The road does not provide for mid-block crossings for pedestrians, nor does it provide warning signs or bicycle lanes. It is built with sidewalks, however they do not carry across the bridge where Ashburn Village Boulevard crosses over the W&OD trail (see photo).



View looking south on Ashburn Village Boulevard looking at W&OD overpass.

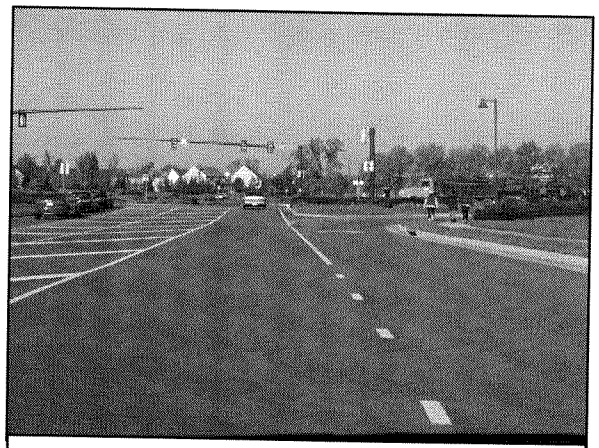
Typical Cross Section –
Ashburn Village Boulevard

5'	5'	11'	11'	12'	11'	11'	5'	5'
Walk	Buffer	Travel	Travel	Median	Travel	Travel	Buffer	Walk

- Posted Speed = 35mph
- Four Lanes – Divided
- No Bicycle Lanes
- Sidewalks throughout except bridge
- Right and Left Turn Lanes
- 120' Right of Way

Gloucester Parkway/Ashburn Village Boulevard Intersection

Each leg of the intersection of Gloucester Parkway and Ashburn Village Boulevard is designed with an un-signalized right turn lane. Each leg provides a corner pedestrian refuge island. Unfortunately, a long merge area is provided to the motorist after making the turn, which encourages higher motorist speeds. There are no pedestrian warning signs preceding these intersections, and there are no measures provided to force motorist to slow down before making the turn. Motorists traveling north on Ashburn Village Boulevard turning right onto Gloucester Parkway have a limited sight distance of the pedestrians in the crossing located in the middle of the turn. This intersection is not utilized for school crossings because of the un-signalized turns.



Ashburn Village Boulevard – Un-signalized right turn slip lane at Gloucester Parkway.

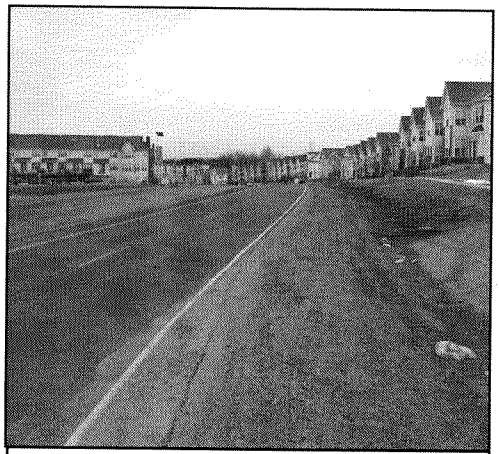
Design Recommendations

Create a Safe Routes to School Program

This school is a prime candidate for adopting a *Safe Routes to School* program because it has a significant amount of residential development located within the 0.8-mile walk zone of the school. Bike/walk trip potential is further magnified by with the presence of the W&OD Trail passing within 100 feet of the school. This school could have a high percentage of students and staff bicycling and walking to school with some physical and security improvements that a Safe Walks to School Program can facilitate.

Safe Routes at Farmwell Station M.S. can be modeled upon a similar effort recently implemented at the Rolling Terrace Elementary School in Silver Spring, Maryland. The program includes the following activities:

- Creating a safe routes to school leadership team;
- Documenting existing conditions, trip patterns, and agency policies;
- Gathering input from teachers, administrators, students, and parents;
- Developing a list of strategies and activities to increase safety and security for students walking and biking;
- Prioritizing a list of physical improvements and implementation strategies;
- Implementing the programmatic and physical improvement priorities.



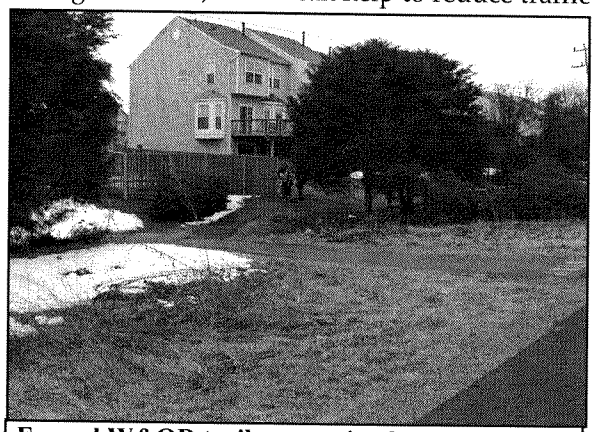
Gloucester Parkway south and east of the school.

Gloucester Parkway

Planning should begin soon for the installation of a traffic signal at the intersection of Gloucester Parkway and Runnymeade. Crosswalks and median refuge islands should also be provided. This will have two benefits. First, it will control access for motor vehicles during the school commute time periods, including buses, staff and parent driven vehicles dropping off/picking up students. The light should be set up to allow free flowing traffic along Gloucester unless a pedestrian, bicyclist or automobile desiring to cross the parkway actuates it. The second benefit is that it will strengthen the link between the school and the residential neighborhood across the street. This will enable those students who currently walk to school to continue to walk to school. It will save the district money by eliminating a need to bus students across the parkway. Additional

improvements in this area should include widening the sidewalk on the west side of Gloucester between the school and Ashburn Village Blvd, and adding curb cuts and bicycle parking on school property.

Gloucester Parkway can be further improved by planting trees along the median and the buffer zones between the road and sidewalks. The road is sufficiently wide enough to accommodate five-foot bicycle lanes on either side by narrowing travel lanes to ten feet and by narrowing the median accordingly. The addition of these features will siginify to motorists that they are entering a residential neighborhood, which can help to reduce traffic speeds.



Formal W&OD trail connection between Tippecanoe and the school.

Pedestrian refuge islands can be constructed at crossing points within the median along the parkway. These crossings provide space for pedestrians to wait who prefer or are only able to cross one direction of travel at a time. In the future, Gloucester should be designed with a combination of crosswalks at signalized intersections and mid-block crossings. Warrant studies for traffic signals at crosswalks should be requested as the traffic increases on the roadway and signals should be installed where they are proven necessary to enable safe pedestrian crossings of the roadway.

W&OD Trail Access and Security

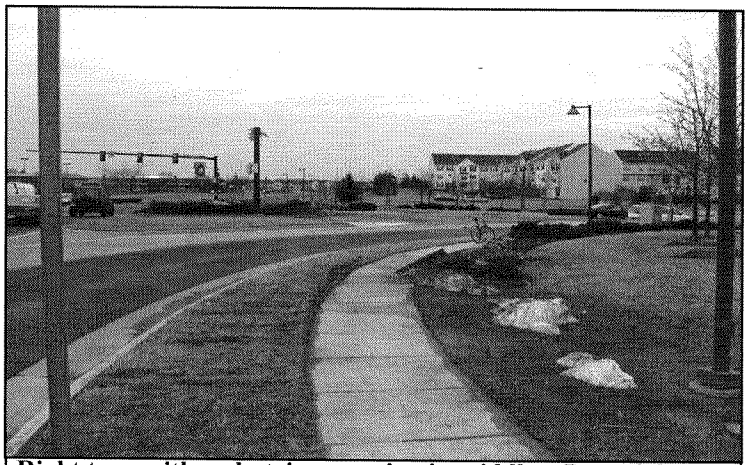
The concerns regarding trail security that the community has expressed can be resolved in a number of different ways. Formalizing the "goat paths" between the Trail and the neighborhoods such as that provided between Tippecanoe Terrace and the school can enhance the appearance, and therefore the feeling, of security. Small landscaping style lights can be installed that will provide lighting that will not be intrusive to neighboring homes. As with any trail, it will be important to maintain brush and undergrowth along the trail. If more bicycling to school is going to be encouraged, additional bike parking will need to be provided at the school to secure the bicycles. It should be covered, attractive and close to the doors that students use to enter and exit the building.

Concerns regarding security at the underpass of the W&OD with Ashburn Village Boulevard can be resolved by providing lighting beneath the bridge. Collaboration between neighborhood associations, community residents, W&OD trail officials (such as the friends of the W&OD), school officials, and public safety officials can yield a working group of citizen volunteers who can assist with policing of the trail before and after school. The friends of the W&OD currently organize trail patrols in different portions of the county.

Gloucester Parkway/Ashburn Village Boulevard Intersection

The shopping mall on the north side of the intersection of Gloucester Parkway and Ashburn Village Boulevard is a major local destination for residents, including many students after school. The intersection is designed to accommodate high-speed right turns that are not signal controlled.

There are no warning signs preceding these turns to notify motorists that pedestrians may be present in the crosswalk. There is a lengthy merge area following the crosswalk, which encourages higher motor vehicle speeds. Short sight distances along each right turn lane further complicate the pedestrian safety issue.

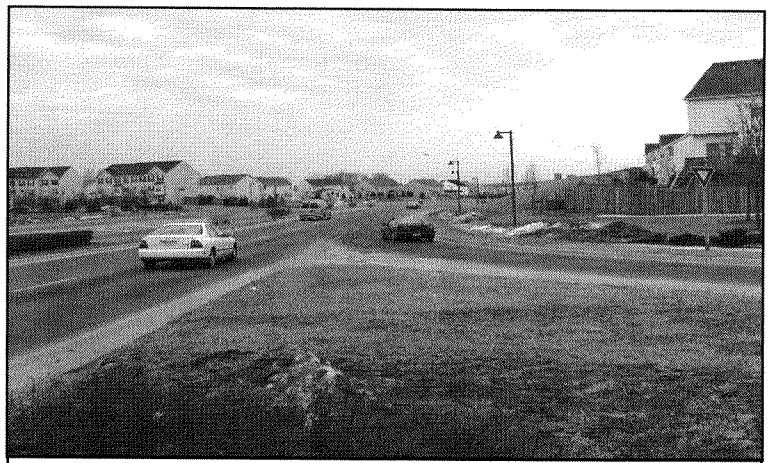


Right turn with pedestrian crossing in middle – Poor sight distance.

It is recommended that signs should be added prior to the intersection to warn motorists of the potential presence of pedestrians in the intersection. Pedestrian detectors could identify pedestrians within the crosswalk, which could in turn activate a flashing warning signal to motorist. The crossing should have a painted crosswalk to provide visual clues to motorists and pedestrians. Rumble strips could be installed prior to the intersection to encourage motorists to slow their approach speeds. Finally, the speed should be reduced to 20 mph to increase the safety of the pedestrians at the crossing.

Cost Factors and Estimates

The items listed below provide ballpark estimates for potential project improvements. It will be necessary to complete an engineering analysis of the corridor before proceeding ahead with any recommendations. These items are shown to provide a general sense of the costs for various pedestrian and bicyclist improvements at the site. It is not intended to be a comprehensive cost estimate. Negligible items generally cost less than five-dollars a foot for installation.



Right turn with pedestrian crossing in middle – Long merge with Gloucester.

Implementation Issues/Opportunities

To improve pedestrian and bicyclist safety, it will be necessary for the Loudoun County Public Schools' Department of Transportation to work with the existing homeowners associations, local principal, parents, VDOT, and local developers to establish clear improvement goals and requirements. It will be necessary to be proactive in regards to the traffic signal, due to the VDOT requirements to perform a warrant study before installing any traffic signals. It may take pressure from the community and County officials to get approval for traffic signal installation before the completion of the parkway. It is recommended that the installation of a signal at the school driveway be accomplished by the time the current residential development is fully occupied, or soon after. At the outside, a signal should be installed before the

Cost Factors and Estimates

New Traffic Light	**$120,000 each**
New Crosswalks	**$5,000 each**
Bicycle Lane Striping	**Negligible**
Bicycle Detector	**$1,000 each**
Road Marking Symbols	**Negligible**
Safety Signage	**Negligible**
Sidewalks	**$30/foot**
Pedestrian Signal	**$5,000 each**
Rumble Strips	**Negligible**
W&OD Signage	**Negligible**

Gloucester is extended further east to accommodate any further development. The goal should be to retrofit the Gloucester/Runnymeade intersection as soon as possible to enable it to operate safely for bus access and egress and become the most efficient and safe crossing point to be staffed by crossing guards for students bicycling and walking to school.

Endnotes

[i] Landis, Bruce W. et.al. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997 (see Appendix B for a copy of the research paper).

[ii] Landis, B.W., V.R. Vattikuti, R. M. Ottenberg, D.S. McLeod, M. Guttenplan. "Modeling the Roadside Walking Environment: Pedestrian Level of Service," *Transportation Research Record 1773*, Transportation Research Board, National Academy of Sciences, 2001.